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UNITED STATES NAVAL INSTITUTE PROCEEDINGS

Vol. 56 NOVEMBER, 1930 No. 333

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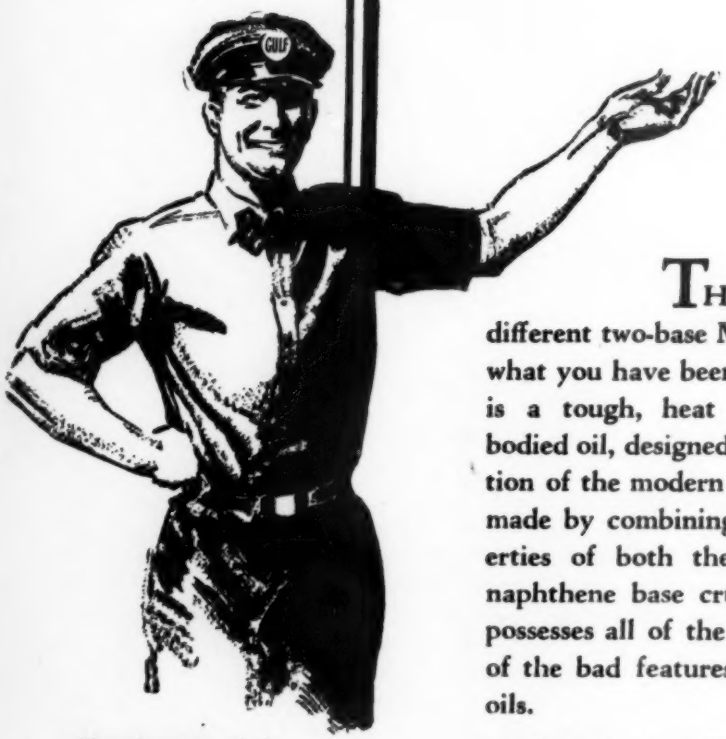

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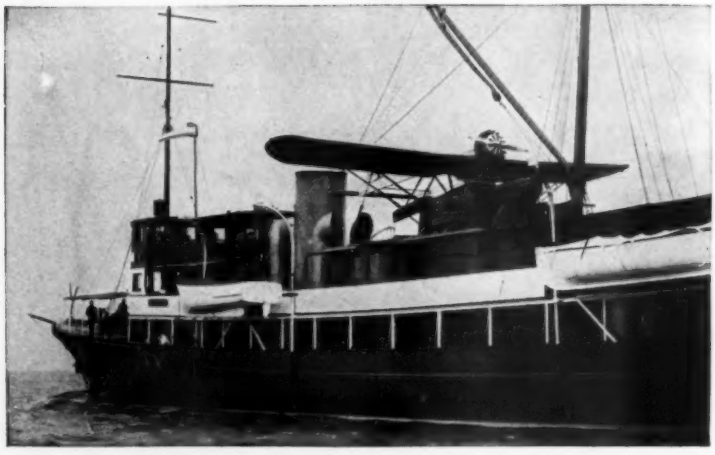
A YACHT THAT HAS WINGS

THE WORLD'S FIRST FLYING YACHT TENDER IS A SIKORSKY "S-39"



Shore parties from the Lotosland *are not landed at harbor docks. Instead, the trim and speedy "S-39" amphibion flies them from ship to shore at over a hundred miles an hour*

Col. Edward A. Deeds, New York financier, has a Sikorsky "S-39" Amphibion on the deck of his new yacht, *Lotosland*, which enables him to save many hours commuting to and from his Wall Street offices. This comfortable five-place cabin plane is believed to be the first "flying yacht tender."

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Shown above is the "S-39" with wheels down, ready for beach or field. Other Sikorsky amphibions are the 10-place "S-38," the 16-place "S-41" and the 40-place "S-40"

The plane is lashed to the upper deck of the yacht just aft of the funnel and lowered over the side with a boom.

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For details write the Sikorsky Aviation Corporation, division of United Aircraft and Transport Corporation, Bridgeport, Conn.

WORLD'S RECORD FOR SPEED WITH LOAD — SIKORSKY AMPHIBION — WORLD'S RECORD FOR ALTITUDE WITH LOAD

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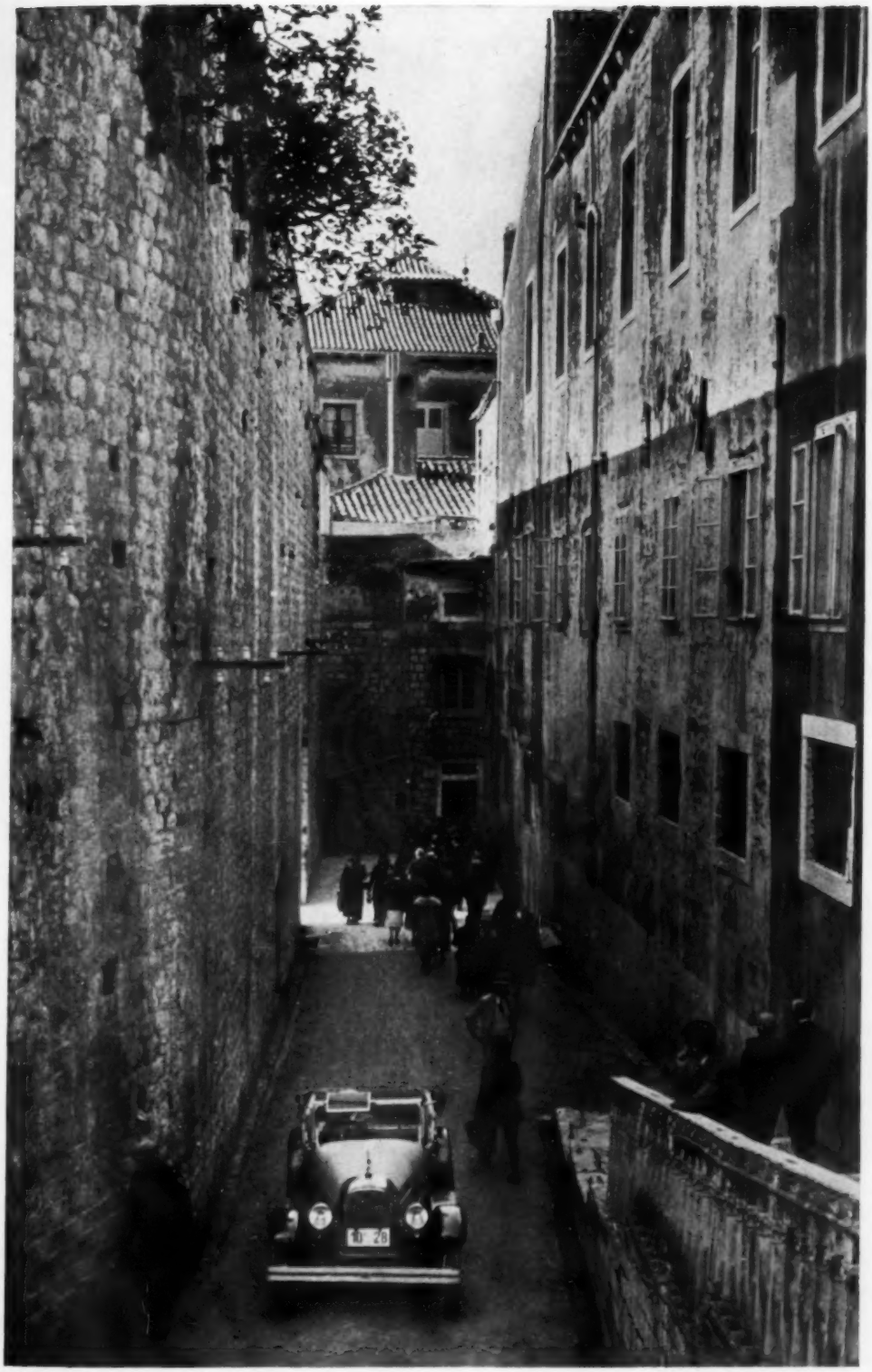

By Burton Holmes from Ewing Galloway

RAGUSA, OLD DALMATIAN SEAPORT

This city was built on a steep mountain side, and its streets are narrow and quaint. This one is typical.

UNIV. OF MICH.

By Ewing Galloway, New York

WALLS AND TOWERS OF RAGUSA, DALMATIA

By Ewing Galloway, New York

GENERAL VIEW OF THE HARBOR OF GRAVOSA, NEAR RAGUSA, ON THE DALMATIAN COAST
The boats at anchor are of the Jugoslav Navy.

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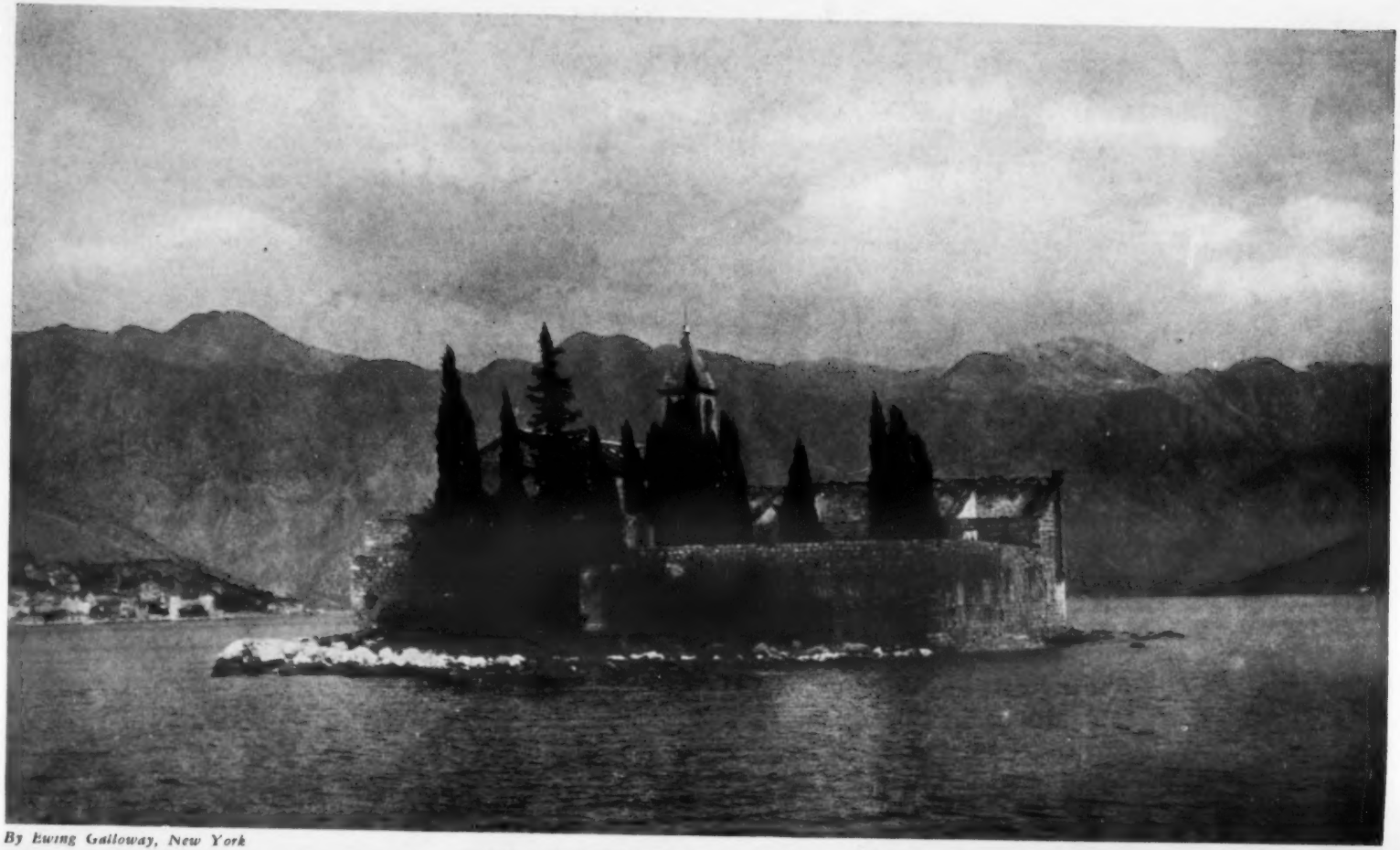

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ISLAND SAN GIORGIO, GULF OF CATTARO, DALMATIA

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ISLAND SAN GIORGIO, GULF OF CATTARO, DALMATIA

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SPALATO, OLD SEAPORT TOWN OF DALMATIAN COAST

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Photo by Elmendorf (c) Ewing Galloway, New York

THE LITTLE TEMPLE AT TRAU, DALMATIA
A relic of ancient civilization on east shore of Adriatic.

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THE QUAYS AT FIUME

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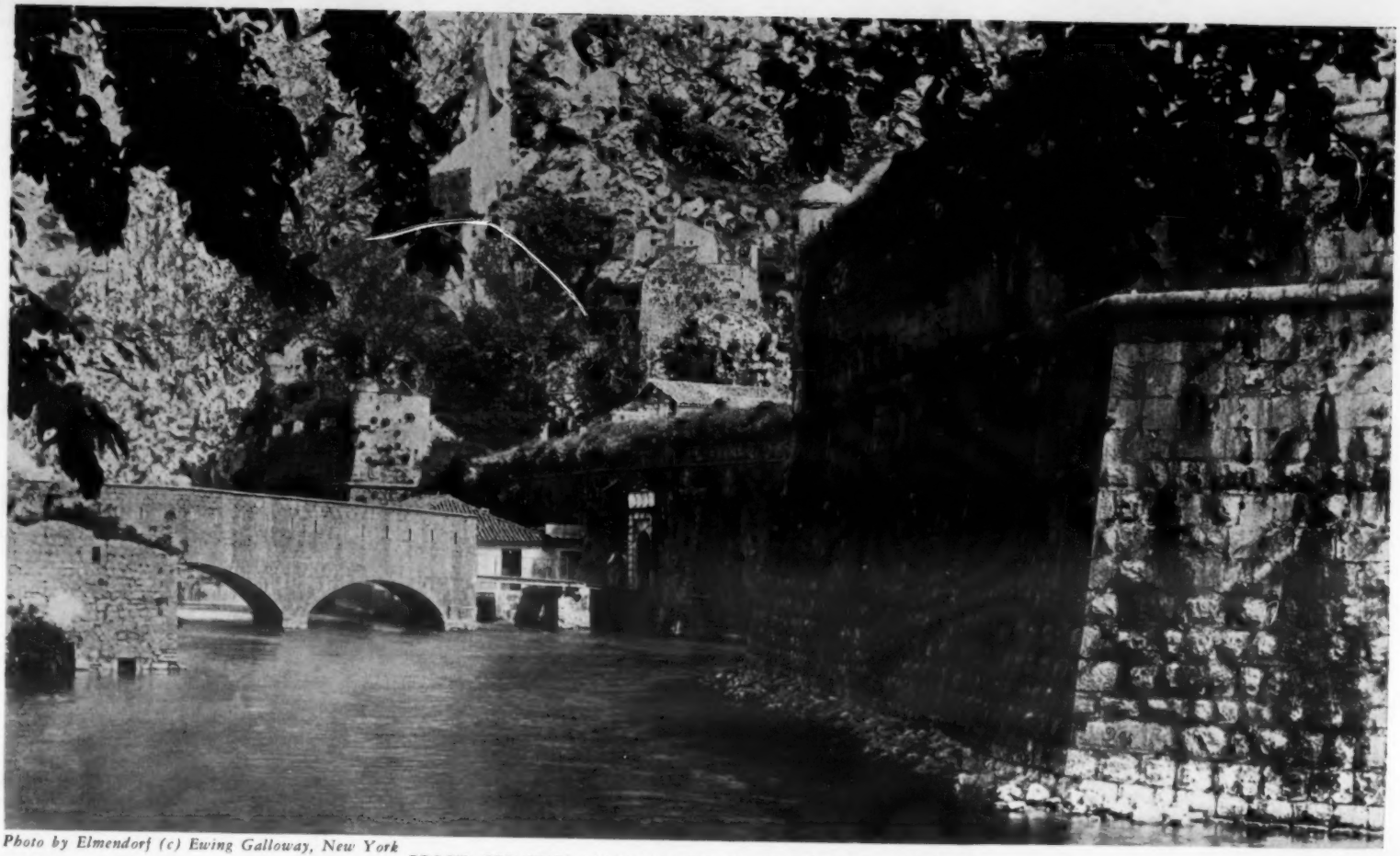

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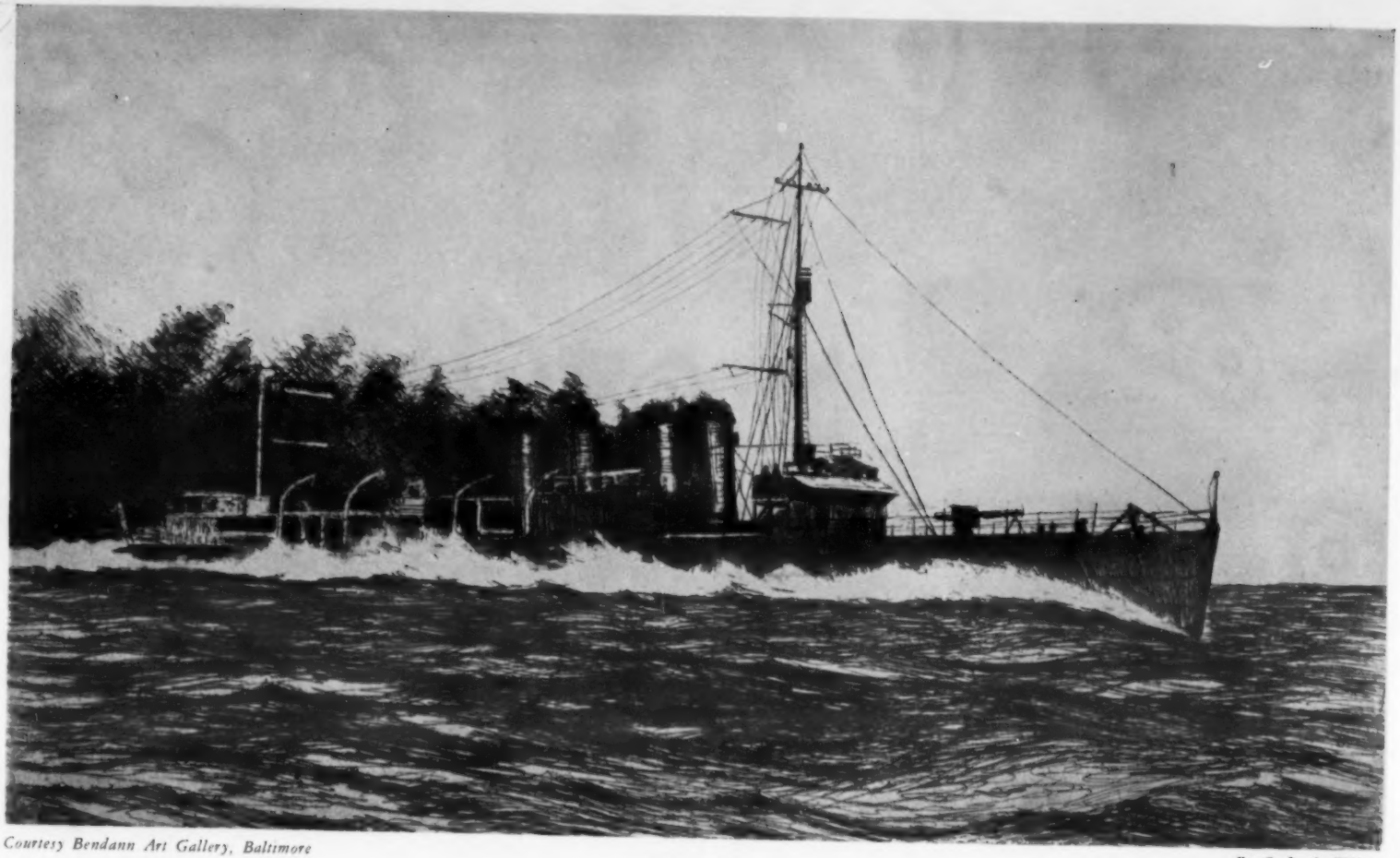
BROOK, OLD WALL, AND OLD BRIDGE AT CATTARO, DALMATIA

BRIDGE, SEA-WALL, AND OLD BRIDGE AT CATTARO, DALMATIA



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Vol. No. 56, No. 11 NOVEMBER, 1930 *Whole No. 333*

Armistice Days *in the* Adriatic

By LIEUTENANT COMMANDER RICHARD STOCKTON FIELD, *U. S. Navy*

WHEN the Armistice was signed, Admiral Beatty remarked that the fighting had finished and that the talking was about to begin. In no theater did this prophecy prove more true than in the Adriatic. The talking went on for two years and there were times when it looked as if the talking would finish and the fighting would begin again.

It came as a surprise to the American people to find their Navy taking part during those two years in the settling of that much debated Adriatic question. Why should we be there? Was there any place in the world where we apparently had less reason to be mixed up in other people's quarrels? And yet there we were from the end of the war until the spring of 1921, accepting the burden of a thankless duty thrust upon us, using our good offices to smooth over other nations' difficulties and in one case at least actually avoiding bloodshed and probable war: the Navy of the youthful transatlantic power taking a unique part in keeping the peace of the world; demonstrating back there in the cradle of civilization and the birthplace of sea power an ability to make peace just as thoroughly as on its proper occasions it has made war.

The Austro-Hungarian Empire before its downfall included the eastern littoral and islands of the Adriatic from Trieste to Montenegro. Contrasted with the scanty port facilities of Italy's sandy shore as offered by Venice, Ancona, and Brindisi, the ex-Austrian coast and islands constituted a mariner's paradise. Trieste, Pola, Fiume, Zara, Sebenico, Spalato, and Cattaro were all first-class natural ports, while the very indented coast line and scores of islands offered dozens of other harbors better than any on the Italian coast. More, the physical layout of the islands and harbors on the rock-bound coast constituted an impregnable maritime fortress, priceless in one's possession, menacing in another's.

The people of the southern provinces of Austria-Hungary were mostly Slavic: Croatians, Slovenians, Dalmatians, etc. These southern or *jugo* Slavs were held in oppression by Austria-Hungary and while furnishing a large part of the army and the greater part of the navy personnel of the monarchy, were nevertheless ambitious to have independence and in the last days of the war just before and during the last great Italian drive on the Piave many Jugoslav regiments deflected, withdrew, and precipitated the Austrian collapse which ended the war for Italy and brought about the armistice on that front. At the same time the Austrian Navy, largely in the hands of the Jugoslavs, declared itself to be out of the war and although attempting to make certain stipulations toward the recognition of a Jugoslavia and the establishment of a Jugoslav Navy, did nevertheless communicate to the Allies its desire to surrender.

The naval and military terms of the Austrian armistice were drawn up by the su-

CHART SHOWING OLD BORDER OF ITALY ON THE ADRIATIC AND NEW BORDER AND ISLANDS GAINED.

preme war council at Versailles on October 31, 1918, and were signed on November 3, 1918. By these terms all vessels of the Austro-Hungarian Navy were to be paid off, completely disarmed, and placed under the supervision of the Allies and the United States of America. Article five was:

> The blockade by the allied and associated powers shall be continued under present conditions; Austro-Hungarian vessels found at sea remain liable to capture, with exceptions which must be approved by a commission to be appointed by the Allies and the United States of America.

All naval aircraft had to be surrendered at a place to be named. All floating craft, naval material, etc. were to be surrendered, and all sea fortifications and islands forming the defense of Pola were to be occupied by the Allies. By the terms of the military armistice all the territory which was not occupied by the Italian troops was to be occupied by the troops of the Allies and of the United States and "— the administration of evacuated territories of Austria-Hungary will be entrusted to the local

authorities under the control of the allied and associated armies of occupation."

The allied naval council met in Paris and decided that the commission referred to in article five to carry out the naval terms of the armistice should consist of representatives of the British, French, Italian, and American navies to meet in Venice.

Rear Admiral W. H. G. Bullard, then in command of the United States Naval Base at Corfu, was on November 7, 1918, appointed American member of this commission. Each of the nations appointed a flag officer. Throughout the life of the commission the Italians made a point of seeing that their member was the senior and hence the president of the body. At the first meeting it was decided that in the execution of the terms of the armistice the enemy coast should be divided into four sectors and that one of the nations represented on the committee should supervise each sector. The Italians were to have the zone they were occupying under the terms of the Pact of London. The British were to have Fiume, the Americans from Cape Planka to Giupana Island, and the French from Giupana to the Montenegrin border. It was further decided that the enemy naval ships were to be gathered at Pola, Spalato, and Cattaro. The duties of the Allies were to take charge of all enemy floating material, preserve order, preserve the blockade, and see that the terms of the armistice were properly executed. It was understood that in the evacuated (as distinguished from the Italian Pact of London zone) territories the local authorities should carry on their government under the supervision of the naval officers of the powers supervising the respective sectors.

When Italy entered the war she had stipulated in the Pact of London the cession to her, if victorious, of that territory from her border south to Cape Planka, inland to the Dinaric Alps and including a large share of the Adriatic islands. As soon as the resistance of the enemy ceased the Italians began energetically to occupy this territory and within a few days from the signing of the armistice they were strongly established in the Pact of London zone. And then from Trieste to Montenegro and far back into the hinterland one heard nothing of Austrians. They were all Italians or Jugoslavs, each side claiming the majority of the population and each clamoring according to his sentiment for annexation to Italy or for union with the new kingdom of Serbia, Croatia, and Slovenia which was beginning to be heard from as the ultimate Jugoslav nation, with Serbia, a victorious ally, as a nucleus.

So the Italians at the moment of victory met with a great disappointment. Whether or not they had foreseen this turn of events we are not able to say. At any rate their surface attitude was one of unspeakable chagrin that any one should question their absolute right to the territory promised them by the Pact of London. They had an open quarrel with Serbia as the direct issue. They were suspicious of the French because, the two countries being potential if not actual rivals, it seemed logical that France might encourage the building up of a new nation which would be basicly opposed to Italy. They were resentful towards America because President Wilson's "self-determination" doctrine had fanned the spark of Jugoslav national aspiration. At any rate there was always in the minds of the Italians that at the hour of victory they were betrayed by their allies and by them blocked from a deserved enjoyment of the fruits of victory.

Vice Admiral Enrico Millo was installed as governor of Dalmatia and the Curzolan Islands. This title clashed with a similar one held by Dr. Ivo Krstel who, in that zone to the southward, unoccupied by Italy, was known as the president of the Provincial Government of Dalmatia. This latter zone included the American sector with Spalato as headquarters, and the French sector within which lay Ragusa and Cattarð. Due to the fact that Spalato, the American headquarters, was also the capital of the provincial government, practically all liaison with that government was through the Americans. This unoccupied Dalmatia was supposed to be purely enemy territory awaiting the disposition of the peace conference. The majority in favor of ultimate union with Jugoslavia was so overwhelming, however, that it was necessary to remind the people frequently that whatever might be their final fortune they were for the present merely part of a conquered nation and that they should conduct themselves accordingly. They were inclined to take such admonition lightly and in such an attitude they were

given moral support by the presence of an occupying force of the Army of Serbia, destined to be the central unit of the union to which they aspired.

When the Italians first occupied their zone of Dalmatia they met with sporadic incidents of opposition on the part of the Jugoslav element but the majority of these opponents settled down to make the best of it under Italian authority, while the irreconcilable minority took themselves away to other parts of Dalmatia, notably to Spalato where, unhindered by Italian power and associated with a Jugoslav majority, they joined from time to time in reprisals against the Italian minority. And so there would be minor persecutions on one side of the line followed by an opposite and vengeful action against the minority on the other side. These incidents were magnified in the reporting and resentment waxed. Governor Millo soon brought affairs in his zone to his liking but there remained one great fly in the ointment, one thorn in the heart—Spalato. From there came stories of atrocious persecution of his people and furthermore the Italians reported that these things were going on under the encouraging or indifferent eyes of the Allies. Admiral Millo accordingly decided to send a ship to Spalato to protect his co-nationals and quite frankly to make propaganda.

In December, 1918, the committee of admirals was directed to, "hold inquiry and make a report to the allied governments showing clearly what is the existing situation and what measures it is necessary to take to safeguard against any disagreement or trouble in any territory occupied or to be occupied by the allied forces outside of those which the Italian troops are at the time occupying."

In response to his request Admiral Bullard was informed by the Chief of Naval Operations in December:

> With reference to your several inquiries regarding the status of Jugoslavs the following is stated: Serbia is considered by the United States as one of the associated governments. The status of the Jugoslavs is unsettled. They have not been recognized by the United States as an independent national organization. However, in dealing with questions which arise as result of their efforts be guided by the general principles laid down by the President. It is desired that your good offices be used to maintain order and assist local governments as necessary in adjusting matters local and international as they arise.

The committee met again at Fiume in December. They drew up a report adverse to the Italian point of view, taking exception as they did to the continued Italian domination of Fiume while the city was under interallied control. It recommended that Fiume be restored to the condition of a city awaiting the decision of the peace conference by reduction of the Italian representation to two battalions and by maintaining one battalion each from France, America, Great Britain, and Serbia. The Italian admiral refused to sign this report and subsequently resigned from the commission. The Allies were never able to carry out the recommendation in regard to Fiume. The Italians increased the number of their troops there and first the American and later the British troops were withdrawn.

When Admiral Bullard broke up his base at Corfu he used the subchasers for various work in connection with his new duties. He sent an officer to Cattaro to represent the United States in receiving the surrender of the Austrian ships. Some officers and men went to Spalato to take charge of the *Zrinyi* and *Radetzky* and two little torpedo boats. The *Birmingham* and some destroyers were sent on to Admiral Bullard soon after he had assumed his new duties. The *Israel* went to Spalato as station ship in the latter part of 1918 and from that time until the spring of 1921 we always had at least one ship there.

Any story of the activities of the American Navy in the Adriatic will necessarily be interwoven with the affairs of the Italian ship *Puglia*. In keeping with Admiral Millo's decision to maintain a station ship at Spalato, Commander Giulio Menini went there with that ship in January, 1919. Menini was a large, kindly man, middle aged, fatherly, and inspiring of confidence. If in his zeal to serve the interests of his country he appeared at times to demand too much of his American colleagues, he nevertheless maintained the most cordial relations and every American who dealt with him will remember him with affection. Every one of the thousands of American officers and men who were over there in those years will remember the old *Puglia*, "aground on her beef bones" just inside the Spalato breakwater. She had the next berth to our *Olympia* and they were somewhat alike in appearance. Captain Menini has published

a book, *Passione Adriatica,* an eloquent description from his point of view of those disturbing days. It is interesting to quote certain of his passages which bear directly upon the personality or the actions of American officers.

Because of the excited mental state of the local people, due to their fear of Italian occupation or aggression, the Allies had frequently expressed the opinion that it would be better for peace and tranquillity if there were no Italian ship at Spalato. This idea was not supported by the Italians. To abstain from keeping a ship there was from their point of view to cede their equal rights, to abandon their Spalatino co-nationals and to forfeit an opportunity to make propaganda and gain a foothold. By all means they must have a ship at Spalato and Menini was instructed at all costs to moor his ship in some way to one of the piers. Thus when the *Puglia* arrived and approached a mooring at the breakwater an American officer went aboard and asked the captain not to moor there or at least to wait until the American captain could see him. Captain Menini however feigned not to understand him and completed his mooring.

In order to gain favor the *Puglia* soon began a systematic distribution of free food which Menini had brought with him for that purpose. This was a great bone of contention from the start. The Italians were quite frankly making propaganda and the Jugoslavs had no way of counteracting it except to try to stop the people from taking the food and to protest vigorously to the Allies that this was not an ethical way to approach a plebiscite. The chief of police told the admirals that before Menini began serving out free food the *Società Operaio* (Italian labor society) had forty members and that the system of having the hungry peasants enroll at the society prior to drawing food from the *Puglia* soon ran the membership to over a thousand. Menini, seeing a thousand Italians where but forty had been before, might well pat himself on the back. One ventures, however, an assertion that by the same methods a corresponding number of British or American or Portuguese co-nationals could have been uncovered.

The *Olympia* went to the Adriatic in January, 1919. The old veteran of Manila Bay had returned late in 1918 from extraordinary service on the Murman coast and after lying for a month or two at a British dockyard was sent on to Venice, stopping at Gibraltar en route to pick up Admiral Niblack and his staff. Admiral Niblack relieved Admiral Bullard and the flagship remained at Venice for about a month. In the meantime Spalato was getting hotter. The presence of the *Puglia* enraged the unstable element of the Dalmatian population and the American destroyer captain had his hands full of petty incidents, accusations, and countercharges. Captain Menini insisted on free circulation in the town for his officers and men. They were jeered at by Jugoslav ruffians and timidly applauded by the Italian minority. At night the officers would go to the little Italian club, *Gabinetto di Lettura,* and there under the portrait of their king would enjoy a "bath of Italianity."

Towards the end of February the committee of admirals was to meet at Spalato. Grand excitement in the town. An American holiday and an American admiral! Notices were posted telling the people of George Washington, Woodrow Wilson, and Admiral Niblack. A great welcome was prepared but they reckoned without their guest. The American admiral very wisely vetoed all demonstration and declined to be the object of any special welcome.

The four admirals arrived, each in his flagship.

Our admiral was admirably fitted for that duty by his heartiness of spirit, his long and varied experience in dealing with foreigners, his ability as a linguist, his firm Americanism, and by his extraordinary patience.

Rear Admiral Ratyé was a delightful French diplomat. He had many occasions to stand very firmly for the interests of his country but his most usual rôle in the committee was to smooth over the taut situations which developed between the other members.

Rear Admiral Kiddle of the British Navy was quiet but effective. His observations were brief, to the point, and showed a complete knowledge of the situation.

The committee was under the presidency of Rear Admiral Ugo Rombo. He was a small, dapper man with a brilliant eye and a square, grey beard, every hair of which was capable on occasion of bristling with furious indignation. Of an ancient and noble family, his every motion bespoke a fierce pride in himself, his profession, and his

country. Socially he was charming. His English and his French were excellent. But as president of the committee he was most difficult, at times offensive. He was an eloquent advocate, too eloquent as a rule, and it is certain that another admiral more diplomatic and conciliatory might better have served his country under those trying conditions.

Menini says:

> The evening of February 23 a ship arrived with the American admiral of the committee, a sympathetic and characteristic figure, very good natured, who laughed at every occasion. He was said to be of the Republican party and not Wilsonian but in any case he showed himself to be well disciplined and obedient to the orders emanating from Wilson. I remember that he had on his staff an American-Florentine lieutenant whose name I have not remembered but who spoke Italian beautifully. I never knew whether he sympathized with us or with the Slavs but in every way he was very correct. (Note: Lieutenant Commander, now Commander, Rufus King.)
>
> As soon as the ship was anchored I went to call on the admiral who requested me as soon as the Italian flagship should be sighted to send to the admiral and beg him to anchor outside for the present, because, he said, "These gentlemen of the local government have made a mistake that I must first straighten out." . . . .
>
> I remember as if it were now the arrival of our admiral with the beautiful *Bixio*, the finest looking and most powerful ship present. . . . . The conversation between him and the American was really tragic. He wanted at any cost to go into the port and to telegraph Millo to prepare troops in case of offense, but the ally who wished to avert any possible occupation by us, plainly threatened a diplomatic incident with the United States if he was not given time to arrange things in the city and our chief had to agree. It was arranged however that he should be the first to enter port the following morning and that the *Bixio* would moor to the San Pietro pier which was right in the city.

The next day just as all the admirals were arriving the populace behaved very badly. Two Italian senior officers were walking in the town and they were surrounded by an ugly mob which insulted and threatened them. One old woman bolder than the rest struck one of the officers with an umbrella. Several American bluejackets arrived on the scene and succeeded in escorting the Italian officers away from the disgusting scene.

That same night about dark, a mob formed and went about the town crying "Down with Italy," tearing down Italian signs and throwing stones in the windows of the Gabinetto. We got word on the *Olympia* of what was going on and the captain took me ashore with him to see whether we should have to land a patrol. You may be sure that Admiral Rombo was loudly demanding intervention and the punishment of all and sundry. Captain Boyd found the police coping fairly well with the situation. President Krstel himself was all about urging the excited ones to restrain themselves. We found a menacing crowd around the Gabinetto held back by *gendarmes* or soldiers. Inside there were several hundred Italians or Italian sympathizers afraid to face the mob and go home. They were willing to go out under our convoy, however, and by the time the captain and I had each made two or three trips we found that the remainder had gotten up their nerve and gone home alone.

The next day, soon after the *Olympia* was moored inside the harbor, the admiral gave his flag captain the job of organizing an international patrol. I have described this patrol in a previous article; it will suffice to say here that for two months we had a patrol of American, British, French, and Italian bluejackets in the town. Thus began my intimate association with the life of Spalato which kept me ashore there practically all the time for the next nine months. As Captain Menini says in his book, "who did a little of everything. Supervisor of the police, organizer of parties, ambassador to the local government. I have sent to call him day or night, etc. . . . ."

As a result of the disorders and the mistreatment of the Italian officers, it was arranged that the president of the local government and the mayor should go aboard the Italian flagship and make an apology. Captain Menini's description of this ceremony sheds considerable light on the character of Admiral Rombo.

> There advanced then in solemn manner the president of the Slav government, Dr. Krstel, in high hat . . . . flanked by the interpreter, Professor Misetic. . . . . Krstel had prepared a long discourse but scarcely had he begun to speak when our chief shut him off, crying vehemently, "Who are you, tell me who are you?"
>
> "I am the president of the Jugoslav government of Spalato," disconcertedly responded Krstel.
>
> "It does not exist!" exclaimed the admiral, furious, "It does not exist, do you understand?"
>
> "It will exist," responded the president.
>
> "Get back!" ordered the admiral. "I want the mayor, I want the apology of the mayor of the city. Come forward the mayor!" Krstel stepped back and there was pushed forward Tartaglia, white faced, not knowing what to do or say.

"Take off your hat and apologize," said our admiral in a loud voice. "If I were in your position I would be ashamed and would put my hat on the ground." And the more the admiral talked the lower went the mayor's hat.

"I beg pardon," said Tartaglia in a weak voice. "I apologize to the offended officers in the name of the city," and he remained uncovered.

"Very well, I accept the apologies," said the admiral. "Go away and come back an hour later and make your duty call."

The mixed patrol kept things fairly quiet. With the eyes of four nations always on them the disturbing element was not so free to break out. One night, however, I was sharply accosted by a drunk who assumed a threatening attitude until his companion restrained him by telling him that I was American. He was all apology in an instant. He had mistaken the device on my uniform for the five-pointed star of Italy. The local authorities were frequently reminded that American or Italian, we were all there in the same status and must all be treated alike with courtesy. One realized, however, that it took more than the authority or the good offices of the American admiral to force these Jugoslavs to like the Italians.

The Italian senior naval officer was very much incensed by the publication at a near-by village of a notice to the effect that the populace had been assured by the American admiral that there would be no Italian occupation of that place. Captain Menini, "full of surprise and indignation," addressed a letter to Admiral Niblack, asking if it were true that he had given such assurance. I quote from the American's reply.

2. My answer is, "yes." I did not, however, give any directions to the local government as to how to use this information, and if they sent this information to Trau to be posted I am very glad of it because it served the purpose for which I intended the information to be used, namely to allay the fear, excitement, and dread which exist in this community that any change will be made in the present arrangement for holding in trust for the allied governments this territory in question until such time as the peace conference shall make its decision.

3. The French delegate has received from his government a declaration of Premier Orlando that Italy has no intention of sending troops into this zone. The Italian delegate to the naval committee for the Adriatic also gave me his assurances to this effect. While the movement of troops in the Italian zone concerns only the Italian authorities, I regard it as only natural that the inhabitants of Spalato and Trau should have been greatly alarmed at a critical time by reports, more or less inaccurate and possibly untrue, that during the night of February 25-26, 6,000 Italian troops arrived in the neighborhood of Muc, within easy reach of Spalato and Trau, and that 6,000 additional troops arrived there the night of February 26-27. There were also rumors of a definite nature that Italian forces had embarked at Sebenico on board the SS. *Cortellazzo* in the afternoon of February 24, with artillery and equipment, ready for service. It is not necessary that this information should have been exact for the effect is the same whether it was true or not. In giving out the definite information that there would be no Italian occupation of the American zone, I am quite sure you will join me in agreeing that I rendered a distinct service to the allied cause by removing from the minds of an excited population the idea that one of the Allies was about to act contrary to the allied spirit and interest.

A. P. NIBLACK.

During these days the committee of admirals was meeting daily. They discussed and acted upon some routine questions such as the regulation of the requisition of merchant shipping, but most of their time was taken up with an inquiry into the political situation at Spalato, the claims and counterclaims pertaining thereto.

Because of the fact that he represented the nation most interested in the affairs under discussion and because the ambitious policy of this nation was not altogether supported by the policies of the other nations represented on the committee, it was natural that the Italian delegate was frequently voted down in his efforts to influence the committee to agree with him.

Menini:

In any case the method of procedure was always the same. They gathered on the *Bixio* at the time which our admiral indicated and I, who understood perfectly their methods, observed invariably for an hour beforehand the passage of barges and motor boats with their chiefs who would meet on one of their ships, where they put themselves in accord and assigned to one another the parts which shortly afterward they must recite and then, one by one, they would go aboard the *Bixio* where their president would open the meeting with the result that, concerning our affairs, one single favorable vote would be found in the urn, that of the Italian; the others voted with touching unanimity always together and against us.

On March 5 a typical incident took place at Trau. The Italian motor schooner *Costante* was alongside the sea wall when a mob of the usual "smart alecs" came along and forced the captain to haul down the Italian flag. The Italian authorities were naturally incensed. Admiral Niblack had notices in several languages posted in the town in which he chastised severely the local

authorities. Having arranged for the presence of one warship from each of the four nations, a ceremony was organized at which the mayor and chief of police came aboard the Italian destroyer and apologized for the outrage.

Menini's book is full of such incidents and he generally reports having referred the matter to the Americans. Sometimes he is satisfied with what they did for him; generally not. In the case of the Morpurgo bookshop, from which the Jugoslavs proposed to condemn certain books because of their anti-Slav tendencies, the Italians made their usual appeal to the Americans and Captain Menini amusingly states that the Americans while not understanding what the row was about, in order not to appear ridiculous, prevented the sequestration. There is something in what he says. I handled that matter for the admiral and we understood that it was a question of forcing the book-dealer to vacate his place of business. The essence of the dispute really mattered little since a word from our admiral one way or the other was sufficient to settle these petty affairs.

It is interesting to observe the different types of diplomacy unconsciously adopted by officers according to their individual natures and the various impressions created by their methods in the minds of the parties between whom their good offices are being employed. The demanding type will lead each party to believe that he is partial to the other. The conciliatory go-between will create such an atmosphere of friendliness in each camp that he will be regarded by both sides as a partisan. The take-it-or-leave-it type will state the plain facts and ask for an answer in the same spirit.

I can conscientiously say that throughout the time they were at Spalato the American officers were entirely neutral and that officially and socially they showed no favoritism. We gave a party once early in our stay before we realized that the Montagues and the Capulets could not be entertained under the same roof. We saw our guests glare at each other and depart in haste. They wrote long letters very courteously explaining their actions. After that we had a dance each Wednesday night but we never again made the mistake of mixing the antagonistic elements. One week we would have the Italians as our guests, the next week the Jugoslavs, and so on. But the point I wish to make is that the same American officers took part in all these occasions and opinion was about evenly divided as to which of the alternate Wednesdays brought the most pleasure. It is true, however, that the average American officer in his associations ashore gravitated towards those people or that person with whom he found easiest communication. One could speak English with Professor Misetic, who was an ardent Jugoslav and a rather clever propagandist. Count Pavlovic and his daughters spoke English and Americans saw a lot of them but nothing to the damage of Italy ever came of that association. Dr. and Mrs. Karamen, leaders in the Italian set, were frequently in evidence and we saw a lot of them and got very friendly. I had a casual acquaintance with almost everybody in town and after learning how to pass a few trivialities in both Italian and Croatian I got along nicely with both parties.

The same officers whom Menini calls *Jugoslavofile* were regarded by the Slavs as pro-Italian. It is too bad he could not have heard Admiral Andrews or Captain Boyd laying down the law to President Krstel on such subjects as the imposition of Belgrade tariff regulations or the recruiting of local men for the Jugoslav Army when the place was still awaiting the disposition of the peace conference.

This "umpiring" or employing our good offices between the political contenders occupied the greater part of the Navy's efforts but there were other things to be done.

Central Europe was starving and the United States was sending food ships to the Adriatic. Trieste was the principal port used by our ships. The Adriatic was packed with mines and these would break away and form a wandering menace whenever the wind blew. To route the food ships, bunker them and service them in the ports of call—this all fell to the Navy. One of these ships was costing from $2,000 to $2,500 a day and one day saved in turn-around would pay the annual salary of a lieutenant. We had a main port office at Trieste from which depended others at Venice, Fiume, Spalato, Ragusa, Cattaro, and Gallipoli. At most of these places we generally kept a destroyer for communication facilities and to transport public servants on urgent duty. The port officer at Trieste organized the Navy

radio station at Vienna which continued to function for several years as the primary means of communication between our government and its interests in middle and eastern Europe.

On March 31, 1919, Rear Admiral Philip Andrews relieved Rear Admiral Niblack. Menini:

> The new American admiral came from London and Paris. He had commanded a large unit during the war. He spoke only English, was a man of most minute detail, lover of his profession, indefatigable and most authoritative worker, Wilsonian and imbued with the idea that Italy acted in the Adriatic from imperialistic motives . . . . but in any case he remained the rigid executor of the orders of his government, and I must confess that although Italian aspirations had found in him a decided adversary, he had for me a real esteem . . . . and I wish here to thank him for that, saying however of him and his work all that I think. . . . .
>
> The admiral's flag captain was from one of the southern states and spoke French easily, to be precise, the classic French of the time of Louis XV. (Note: Captain David F. Boyd.)

Admiral Andrews' tour in the Adriatic lasted for two years. During that time he learned a great deal about that part of the world. He visited Belgrade and Rome more than once; he knew the leaders at both capitals and was on frank and easy terms with the leaders "at the front," so to speak. But even now in a recent letter to the author of this article the admiral warns that politics should be avoided because "neither you nor I really know anything about that side!"

Our admiral had no real authority in the so-called American zone except in a very general way in the execution of the terms of the armistice. Due, however, to the mere fact that he was there he was frequently called upon by both the Italians and Jugoslavs, and especially by the former, and requested to take positive and retributory action towards the correction of alleged or real evils. He was powerless to act in the majority of cases except in the employment of his good offices. There probably has never been an occasion in the history of our Navy when this function of good offices has been so continually in use over so long a period as at Spalato from November, 1918, to the spring of 1921.

No affair was too insignificant and many were the occasions. When the *Nino Bixio* changed her berth some nit-wit got some red paint and wrote on the vacated pier, "*Nino Bixio* stinks!" I must go with an Italian officer and the chief of police and see the insult erased. The medical officer of the *Puglia* goes to Trau in civilian clothes to call on his fiancée. He is arrested at night but released when he identifies himself. Next morning still in town he is arrested again and sent back to Spalato. Apologies; misunderstanding. A Serbian lieutenant is arrested in the Italian zone and sent back to Spalato in a destroyer. We must receive him and turn him over to his own. An Italian sailor is investigated for having allegedly made an obscene remark to a Serbian officer. A Croatian youth is brought in for shouting at the doctor of the *Nino Bixio*, "The Italians are only capable of running away!"

And then once I sat on a board consisting of one officer from each of four navies to investigate "the report of the Italian artificer Lisciando Vito, member of the interallied patrol, who states that the French members of the patrol bore themselves openly favorable to the Jugoslavs, shouting 'Bravo' and throwing kisses to Jugoslav ladies—etc." One night the admiral sent me to get an Italian soldier out of jail. We searched for him all night after being assured by the military and police that they had no such prisoner. We located him just before daylight in a prison within the very walls of Diocletian's palace and it gave me great pleasure to invoke the admiral's authority and make the chief of police get out of bed and go with me to release the soldier.

Some girls leaving the vicinity of the *Puglia*, where they had been visiting with their friends, were, for very devilment, arrested and accused of being loose characters. Menini notified our admiral immediately and he took the matter up vigorously with the local government. The latter claimed that in spite of their protestations of innocence the girls really were bad and that they would prove it. This was an affair that might lead on and on and its solution seemed hardly a fitting job for us. At any rate some sort of apology was exacted but it was far from satisfactory to any chivalrous person. Two women of opposite politics engaged in a public brawl. "Your king is a so and so," said the Jugoslav. "Yours is a butcher," shouted the Italian, and again the good offices of the Americans were brought into play.

And then in September, 1919, occurred the so-called Trau affair, which but for the prompt action of the Americans might have brought on an open war between Italy and Serbia.

Trau is a little jewel of a Venetian seaport at the western end of the Canale Castelli. It nestles at the foot of the barren mountains which form the water shed between the valleys of the Kerka and the Cettina rivers. The heart of the little town is surrounded by a fifteenth century wall which is decorated here and there with the conventional lion of St. Marc with his foot resting in the open book of Venetian science. The Jugoslavs have altered one of these marks. They will lead you around behind the church and up an alley and there they will show you the lion of Trau, posed with his foot on a closed book. The book of Venice. Trau is fifteen miles west of Spalato by road, about thirty miles by deep water. The Italian lines were twelve miles to the northwest.

A certain Fanfogna of Trau, dreaming of being a second d'Annunzio, had tantalized some junior officers of the Italian Army of occupation and had persuaded them to join him in a magnificent stroke which would join Trau to Italy and make great men of the bold spirits who accomplished the deed. So early in the morning of September 22 the American senior officer at Spalato received hurried and urgent calls from the Italian captain and the Serbian town major. Two Italian officers and about ninety men in four camions had arrived at Trau before daylight, had surprised and locked up the small Serbian garrison and, placing themselves at the disposition of Fanfogna, had "annexed" Trau to Italy. Governor Millo had promptly disavowed this unauthorized, hot-headed act of the subalterns and had telegraphed Menini to get in touch with the Americans and try to send back the renegades before the Serbians acted in force. Captain Boyd sent the *Cowell* to Trau and I was to go by motor and take Commander Maroni of the *Puglia* with me. My job was to intercept the bellicose Colonel Plesnicar of the 13th Serbian Infantry and urge him to wait while Maroni persuaded the misguided Italians to go back where they belonged.

With a large American flag lashed to the bow of the wheezing old Dodge, Maroni and I started out. All along the road warlike steps were in evidence. The Salona bridge was barricaded and machine guns and infantry were disposed for defense of the highway. We found Colonel Plesnicar at Castel Vecchio a few miles from Trau. He grudgingly agreed to the plan and said he would wait for two hours to hear from our efforts before he would advance. Except for the downright urgency and seriousness of the moment and the business in hand one must have laughed at the evident disappointment of this soldier who wanted nothing on earth but a good fight and instead had to wait while tact, diplomacy, and common sense went ahead and deprived him of the best opportunity he had had since the battle of Monastir! Plesnicar insisted that one of his officers should go with us, so Maroni and I were joined by a Serbian lieutenant who spoke French and proved a very level-headed fellow.

On the outskirts of Trau we found two Italian camions and a party of soldiers, most of whom were lying around asleep. Maroni in a few earnest words persuaded their officers to go with us into the town. There we met the other officer and Fanfogna, who tried to take charge of the conversation, but Maroni would not treat with him at all and continued to talk with the army officers. These were not hard to convince and were just about to give orders for their men to assemble for departure when Commander Van Hook of the *Cowell* arrived. The Italian leader then to save his face told Van Hook that he would go provided the American forces would occupy the town and exclude the Serbs. Van Hook would not hear of such a proposition but he landed a small patrol to cover the disordered period between the departure of the Italians and the reëstablishment of the Serbian routine.

One of the camions could not be started and had to be left behind. This caused some disorder, the result of which was that one officer and one man remained behind at Trau. They were placed aboard an Italian motor launch which had followed the *Cowell* from Spalato. Maroni and I followed the soldiers to the boundary line to make sure they were out of trouble and then I went back to Castel Vecchio and disappointed Colonel Plesnicar by informing him that the Italians were all back in their own zone. Maroni, having done a good

day's work for Italy, returned to Spalato in his motor launch.

This was a close call. These Serbs had no interest in the niceties of diplomacy. Time and again Colonel Plesnicar had bluntly said that he wanted to fight. This day he was suffering from the indignity of having his small garrison surprised and locked up and we knew that when he gave us two hours in which to get that expedition peacefully away from Trau he meant two hours and no more.

Captain Menini reports this affair and adds:

> The Serbians took charge of the camion and of several helmets abandoned by our men in their hurried departure; they brought it all to Spalato and carried the booty in triumph through the city as if it was a captured prize of war, singing of the heroic Serb soldiers who as always had been ready to defend the sacred threshold of the country, and one of our helmets was exposed in a shop window with unbecoming humorous inscriptions. . . . . The camion remained in the possession of the Serbian military authority who wished to send it around through the Jugoslav country as a trophy and it took several months of effort of the American admiral to get it back.

I remember going many times to various Serbian military authorities on the subject of this camion. As far as I can remember no one of them ever advanced any good reason why they should keep it but they kept it. And when they did turn it over to us after many weeks it was far from being in the condition in which they had received it. It was one of those trucks with double rear wheels and they had removed one tire from each pair before giving it up.

Menini asked the American captain to publish a manifesto informing the people that the Trau affair had not been an act of the responsible Italian authority, that no such acts were contemplated, and that the people should be calm.

Menini:

> Then the American captain, to tell the truth, published a proclamation that was very well done in which after conveying the very conciliatory ideas of Admiral Millo he inserted a fine eulogy of Maroni, saying that everybody should admire the manner in which this Italian officer had executed the instructions of his captain, accomplishing with admirable abnegation a thankless mission against his own compatriots.
>
> The Jugoslav government ruined everything however by adding that the American's modesty was as great as his love for Jugoslavia and that all the credit for the arrested invasion should go to him. And he, naturally, allowed it to be said.

On July 11, 1920, a real tragedy occurred at Spalato. Captain Menini had some time before been relieved by Commander Tommaso Gulli, who continued to carry on as before, maintaining the *Puglia* at Spalato to show the flag and to protect the "co-nationals."

On this night, fearing for the safety of some of his officers who were ashore during a disturbance, Captain Gulli sent a small motor boat in to the inner landing with instructions that if further assistance was needed they should fire a Very rocket as a signal. The little boat party found a menacing crowd at the water front and, believing that his brother officers were in trouble, the boat officer fired his Very pistol. Gulli himself took charge of a large motor boat which was armed and ready and rushed to the scene. When he got to the little pier he found a very tense situation but there need not have been even then any serious happening. The chief of police called out to Gulli that his officers were safe at the Italian club and Gulli was probably on the point of ordering his boats back to the ship when the mischief was done. Some one on shore threw a bomb which burst in the crowd. The tense nerves of the people ashore and in the boats were overcome and firing began immediately. Poor Gulli was hit in the stomach and in spite of the efforts of his own people, the Jugoslav doctor, and an American medical officer, he died that night. An Italian enlisted man was also killed.

It was a heart-breaking affair. It served to sober all the people to the realization that such things could not go on. A more tolerant attitude must be assumed by both parties. It was such a cruel lesson!

The American Navy had no repair facilities of its own in that part of the world. Admiral Andrews found the Italian Navy particularly courteous in placing at his disposal its dockyard facilities at very reasonable costs. The dockyard at Venice helped us out in many ways and the old Austro-Hungarian yard at Pola, which was operated by the Italian Navy for a while and then turned over to a commercial company, did a great deal of work for the American Navy.

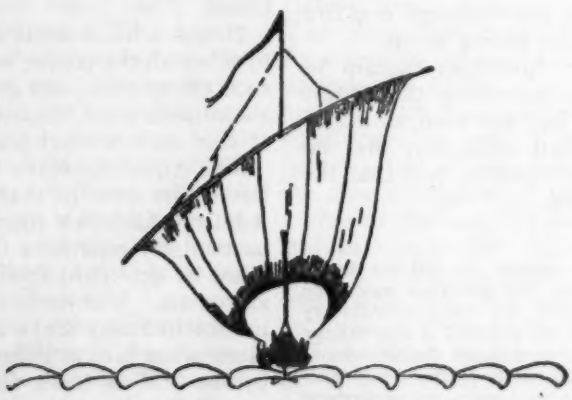
Having guarded the ex-Austrian battleships *Zrinyi* and *Radetzky* for two years, we finally got orders in October, 1920, to turn them over to the Italian Navy. The

plan was to tow them out beyond Zirona passage and transfer them to Italian tugs. After waiting for appropriate weather the job was undertaken on November 7. The *Olympia* put a line to the *Radetzky*, the *Chattanooga* to the *Zrinyi*. Then with a destroyer on each side of each battleship the anchors were weighed and they went ahead. Both the tow lines parted while making the turn to get out of the Canale Castelli but the destroyer captains handled the job skillfully and brought it to a successful conclusion. We had also been custodians of two small torpedo boats, numbers 12 and 52, but these were driven ashore in the fierce *bora* of October, 1919, and were completely wrecked. As they also were ordered turned over, that transaction was done on paper. The Italians receipted to us and then expended them "where they are as they are," being careful, however, to get a statement from the Jugoslavs that they would not attempt to use them.

In November, 1920, virtually without warning 7,000 Russian refugees were brought to Cattaro and Ragusa. The Jugoslavs had offered to take care of them and send them to the interior but they had made little or no preparation to receive them. Admiral Andrews got busy and secured the assistance of the American Red Cross in Montenegro which sent doctors, nurses, supplies, and clothing. The American Navy filled the gap until the Red Cross took over. Destroyers were used to transport stores and officials. A Navy doctor was kept available with a destroyer to take him where he was needed. Another destroyer rushed from Venice to Cattaro with serum which averted a typhus epidemic. The refugees were gradually taken inland and the pressure at the coast was reduced.

Little has been heard of this emergency humane service. Hundreds of lives were saved and untold suffering avoided by the prompt action of our forces. Surely in this emergency and in the greater one which occurred in Turkey two years later, the American Navy saved more lives than it would destroy in the course of a great war.

The maps will tell the tale of the allocation of disputed territory. Zara is Italian, the Istrian peninsula, the islands of Cherso, Lussin, Lagosta, and several smaller ones are all part of Italy. Jugoslav names have replaced the Latin names of certain places. Sebenico is now Shibenik, Ragusa is Dubrovnik, Trau is Trogir, Spalato is Split, and the children are grown, those who used to cry, "Long live Wilson because he owns a chocolate factory!"



This Admiral Business

By MIDSHIPMAN THOMAS D. F. LANGEN, *U. S. Navy*

A CARTOONIST contemporary of the famous Ripley recently made the statement that George Dewey was the only man to hold the rank of admiral of the Navy. Immediately there was a storm of denial. Hadn't Farragut and Porter also been admirals? That was the gist of most of the thought on the matter. Nor was the subject confined to civilians. Many of the midshipmen and quite a few of the officers believed the cartoonist to be in error. Now we of the Navy should know about the topic and not hazard a guess.

In the light of our own Gallipoli we can more readily appreciate the greatness and boldness that was Farragut's when he fought at Mobile Bay. This battle and New Orleans endeared David Porter's foster son to the American people. At that time, as at this, we were a hero-loving public. Today we make a daring and skilled aviator a rear admiral. Yesterday there was no such office. For David Glasgow Farragut the rank was created. The year 1864 brought the higher and newer office of vice admiral. And two years later found him our first admiral with permanent rank.

The second recipient of the honor was Farragut's foster brother and the first president of the Naval Institute, David Dixon Porter. No midshipman of any day, past or present, can forget the debt we owe to Porter for his introduction of baseball, rowing, and boxing. But it was his service on the Mississippi that won him his place with the people and permitted that he succeed to the high office of Farragut. However, when, on February 13, 1891, Admiral Porter died, the grade of admiral ceased to exist as the grade of vice admiral had so ceased the year before on the death of Stephen C. Rowan. Thus it happened that there was no office of admiral to give to Dewey.

By presidential order, relying on a forgotten statute, Dewey was made rear admiral. Congress soon followed suit and declared him rear admiral by act. But other men had been rear admirals and there was only one Dewey. Something greater had to be done. Accordingly, Congress ignored such grades as vice admiral and admiral. By Act of March 2, 1899, the hero of Manila Bay was made admiral of the Navy, a rank equal to the admiral of the fleet in the British Navy—such office to cease upon the death or voluntary retirement of the incumbent. Because the list of officers in the pay bill made no provision for admiral of the Navy, a rider was attached to the appropriation bill of March 3, 1899, making the office and its pay a surety.

Thus it is that we find that the three admirals we have always known never really existed. Farragut and Porter held the permanent rank; but Dewey never did. To him a special grade was given.

To complete the matter, we must here state the position of the four admirals and two vice admirals at present holding those titles. The Navy knows this part of the subject; but few others do. These officers hold the ranks assigned only during their incumbency of certain offices. These offices are as follows: admirals: Chief of Naval Operations; Commander in Chief, United States Fleet; Commander in Chief, Battle Fleet; and Commander in Chief, Asiatic Fleet; vice admirals: Commander, Scouting Fleet; and Commander, Battleship Divisions, Battle Fleet. While on these tours of duty, these officers receive the honors due the offices mentioned; but on the culmination of their duties they revert to the rank previously held. This is possible because at no time did they change their grade and at no time did they have the grade of admiral or vice admiral. Their sole perquisites were the duties, rank, and allowances of those offices, and these passed, when the officer was relieved.

The U.S.S. *Lancaster* Observes *a* Revolution

By CONSTANCE LATHROP

ONE of the peace-time duties of our Navy has ever been to protect American interests in all parts of the globe. In performing this service the officers of our naval vessels have witnessed many historic events. It fell to the officers of the U.S.S. *Lancaster* in the summer of 1897 to participate in one of the most stirring dramas ever enacted before an expectant yet powerless gathering.

The scene of the drama was the capital of the Republic of Uruguay, as that country is officially known. Physically, the smallest independent nation in South America, that peninsular-like republic now seems destined for great economic and political progress. Today, Uruguay's advanced social legislation seems the model not alone for Latin America but for like democracies in general.

These conditions have not always prevailed. Since her independence in 1828 Uruguayan history has been torn by politic-social changes. Her two political parties, named respectively, the Blancos and Colorados held no essentially different political views. Their differences were based on family tradition and like considerations. The Colorados held for many disturbed years the political power. The efforts of the Blancos to dislodge them always resulted in eras of revolts. The military element was a deciding factor in these upheavals. It either lent or refused its support with results easily foreseen.

In the late eighteen eighties, Herrara y Obes became president, succeeding General Tajes, a Colorado, whose political *factotum* he had been. Immediately the entire country became administered as though it were the private estate of the president. There was no pretense of an accounting to the public of the governmental revenues and expenditures. In 1894, Juan Idiarte Borda, a friend and disciple of Herrara y Obes succeeded him; the former president serving as the premier of Borda's cabinet in the capacity of minister of foreign affairs.

The general dissatisfaction of the people grew by leaps and bounds. In 1896 the Blanco party gathered together its forces under the pretext that the elections of that year were fraudulent. Aparaceo Sariava led that revolt. Disturbances continued for a year or more. Military expenditures increased, taxes increased, and economic depression followed. A public feeling of bitter hostility was engendered. This feeling was not alone toward the government, but more particularly was it evidenced toward President Borda.

Shortly before the Sariava uprising the U.S.S. *Lancaster* arrived on the South Atlantic Station after a voyage, under sail, of one hundred and one days from Newport, Rhode Island. Captain Yates Sterling (later, Rear Admiral Sterling) was transferred from the *Newark* to the *Lancaster* when the former vessel was ordered home. With her on this station were two other American men-of-war, the *Yantic* and the *Castine*.

The duty at its best was a tedious one; anchored in the La Plata River, with a vast estuary on one side and the more desirable, but not always attainable, city of Montevideo on the other. The prosaic days were sometimes enlivened by the advent of a strong wind, known as the *pampero*, sweeping over the pampas of Argentine. This gale turned the river into a coffee-colored torrent and generally cut off the squadron from communication ashore for three or four days. When conditions indicated that a *pampero* was due the younger officers requested shore leave for the afternoon only, knowing they could rely on the *pampero* for three or four days ashore, none of which would be charged against leave credits.

The Aparaceo Sariava revolution however changed the even tenor of the squadron's way. The culmination of the revolt

which they were observing, tragic and unreal, convinced the wardroom of the *Lancaster* that truth is stranger than fiction. The manner in which they learned this adage is herein related. Very early in 1897 an attempt was made on the life of President Borda. It failed. Thereafter, as the revolution progressed, Borda rarely appeared in public. Two important events in the revolutionary movement occurred at this time. A battle was fought—a successful attempt was made by armed bodies of Blanco rebels to capture two government steamers plying between Buenos Aires and Montevideo.

Upon the approach of August 25, the anniversary of the independence of Uruguay, a demonstration was made before the presidential palace to express their dissatisfaction over the conduct of public affairs under President Borda. At the same time negotiations with the Blanco rebels tending toward peace were broken off by the Borda government, which was held responsible for the continuation of disorders. These two significant occurrences were followed by the announcement that Independence Day would be celebrated with the customary ceremonies and festivities.

These ceremonies consisted of religious services at the Cathedral Matriz, attended by the president and his cabinet, and to which all foreign officials were invited. The president and his distinguished guests then marched through the streets of the city to the palace where a public reception was held. President Borda had sent out invitations for dinner that night to be followed by attendance at the opera.

The schedule of festivities created immediate adverse sentiment throughout Montevideo. On August 25 a number of handbills appeared in the streets, asking patriotic citizens to show their disapproval of the celebration by remaining indoors.

An invitation to attend the ceremonies commemorating Uruguay's independence was sent to Captain Yates Stirling and the officers of the squadron by Coronel Muro, captain of the port, in the name of his government. The invitation created little interest in the wardroom of the *Lancaster;* until one of the officers at the mess table in chiding the others present for their indifferencee, told them of his surmises regarding the coming days' events.

"Don't you realize," he said, "that they are going to shoot the President?—Borda has never stuck his nose out of the palace since last April when that youngster took a pot shot at him. He now intends to walk six blocks through the streets of Montevideo, and everybody believes there are at least fifty people along the curb waiting to take a crack at him." Whereupon he produced one of the handbills which had been distributed to the populace which was eagerly translated. It read:

> The moment has come to show publicly to the tyrannical despot who unhappily rules the destinies of our country; that just as an entire populace a few days ago shut up its doors and went out into the streets to demonstrate the joy with which it would receive an honorable peace, the same manner it knows also on August 25, when the vile tyrant wishes to celebrate it by sending out to shine on soldiers enlisted by force the uniform of Porteria, Arteaga, and Borda, to shut its doors as evidence that it never will wish festivities while our brothers pour out their precious blood on battlefields. We invite then that all Orientals and foreign residents remain permanently in their houses during the hours of the parade and that all families and places of business close their doors and blinds. Those who may be on the balconies or meet to give importance to the festivities by their presence will show that they have been paid by the despot who continuing to rob does not desire peace. VARIOUS ORIENTALS

All present in the wardroom promptly sent in their names to be included in the list of guests. Captain Stirling and the officers of the *Lancaster* and *Castine* with the members of the diplomatic corps and the American minister, the Honorable Granville Stuart, arrived at the Cathedral Matriz a little ahead of the appointed hour of one-thirty and were shown to the seats reserved in their honor. The president, his military aides, and cabinet officers, soon appeared and in taking their seats completed a semicircle of participants before the altar. Behind them were ranged such people as might have drifted in from the streets. There were no representative citizens present. It was apparent they had obeyed the injunction to remain away.

President Borda sat at the apex of the semicircle behind a table, clad in a dress suit, a sash with the arms of Uruguay diagonally across his shirt front. His silk hat, gold-headed cane, and overcoat lay on one end of the table. He sat through the long services with a pale set face, his aspect being the only evidence of his knowledge of the inevitable fate that awaited him; perhaps from some hand in the throng behind.

After the chanting of the *Te Deum*, the Archbishop of Uruguay who had been conducting the services approached the president and spoke briefly to him. The president then arose and together the two passed out of the cathedral, the archbishop on the right of the president. They proceeded on foot up Calle Carandi toward the government house, followed immediately by the aides, the cabinet officers, and other guests. To the left of the line of march a number of batteries of artillery and troops of lancers were in line, fronting the direction of the march, thereby making it neccessary for the procession to walk close to the curb on the right. They had progressed about eighty yards when suddenly a man stepped forward and fired a revolver point blank at the president's breast. The president received the shot, took two steps in his walk, and sank to the street mortally wounded. He was carried into the House of Representatives.

The assassin, a youth named Avelino Arrendonda, was quickly assailed by the mounted lancers. He was rescued with difficulty by the American vice consul, and taken to the Cabildo for questioning.

Within ten minutes the sentry posted before the government building removed his rifle from his shoulder, carrying it, thereafter, at reverse arms. So passed Juan Idiarte Borda with a brave gesture; knowing full well as he set forth to celebrate Independence Day that his death in some tragic manner was imminent. Courageously he met his fate.

Two years before these events in the history of Uruguay, Richard Harding Davis wrote his *Soldiers of Fortune*. This book was a novel involving a revolution in a mythical South American republic. The climax of the story is reached when the president of the republic is required to review his troops with the knowledge that there was probably one chance in a thousand that he would return from the review alive.

The fictional character, President Alvarez of the mythical republic of Olancho, marched to his death in the same manner as did President Borda, absolute ruler of Uruguay, and for the same reason—his party required him to display a semblance of power before a populace who wished to overthrow it.

Soldiers of Fortune had been read by several members of the wardroom of the *Lancaster*, and considered a very interesting bit of fiction. After witnessing the assassination of President Borda all agreed that the duty of protecting American interests on foreign soil might prove stranger than any tale of fiction.

Courtesy Naval Observatory, Washington, D.C.

TITLE-PAGE OF BAYER'S *URANOMETRIA*

This collection of celestial charts, according to Lalande, was the first that had been made with intelligence and care.

ASTRONOMIA
REFORMATA
AD
Sereniſſimum D.
FERDINANDVM MARIAM
BAVARIÆ ETC.
DVCEM.

BONONIÆ. MDCLXV.

Ex Typographia Hæredis Victorij Benatij.
SVPERIORVM PERMISSV.

Courtesy Naval Observatory, Washington, D.C.

TITLE-PAGE OF A RARE WORK BY RICCIOLI

ASTRONOMIAE REFORMATÆ TOMI DVO.

QVORVM PRIOR OBSERVATIONES, HYPOTHESES, ET FVNDAMENTA TABVLARVM.

Posterior præcepta pro vsu Tabularum Astronomicarum, Et ipsas Tabulas Astronomicas CII. continet.

PRIORIS TOMI IN DECEM LIBROS DIVISI. Argumenta Pagina sequenti exponuntur.

AVCTORE

P. IOANNE BAPTISTA RICCIOLO
SOCIETATIS IESV.
FERRARIENSI.

BONONIÆ, MDCLXV.

Ex Typographia Hæredis Victorij Benatij.
SVPERIORVM PERMISSV.

Courtesy Naval Observatory, Washington, D.C.

DEDICATION PAGE OF A RARE WORK BY RICCIOLI
This book contains an important collection of observations.

SMITH OF ICH

JOHANNIS HEVELII

MACHINÆ COELESTIS

PARS POSTERIOR;

Rerum Uranicarum OBSERVATIONES,

Tam Eclipſium Luminarium, quàm Occultationum Planetarum, & Fixarum,

Nec non

Altitudinum Meridianarum Solarium, Solſtitiorum, & Æquinoctiorum;

Unà cum

Reliquorum Planetarum, Fixarumq; omnium hactenus cognitarum, Globisq; adſcriptarum, æquè ac plurimarum hucuſq; ignotarum

OBSERVATIS;

Pariter quoad

Diſtantias, Altitudines Meridianas, & Declinationes;

Additis

Innumeris aliis notatu dignisſimis, atquè ad Aſtronomiam excolendam maximè ſpectantibus rebus,

Plurimorum annorum, ſummis vigiliis, indefeſſoque labore, ex ipſo æthere hauſtas, permultisquè Iconibus, Auctoris manu, æri inciſis, illuſtratas, & exornatas,

TRIBUS LIBRIS,

exhibens.

Cum Gratiâ & Privilegio Sac. Regiæ Majeſt. Polon.

GEDANI.

In ædibus AUCTORIS, ejusq; Typis, & Sumptibus Imprimebat

SIMON REINIGER.

ANNO M DC LXXIX.

Courtesy Naval Observatory, Washington, D.C.

TITLE-PAGE OF THE SECOND PART OF *MACHINA COELESTIS*

Courtesy Naval Observatory, Washington, D.C.

TITLE-PAGE OF THE SECOND PART OF *MACHINA COELESTIS* OF HEVELIUS

This book is believed to be the rarest astronomical work that exists anywhere.

UNIV. OF MICH.

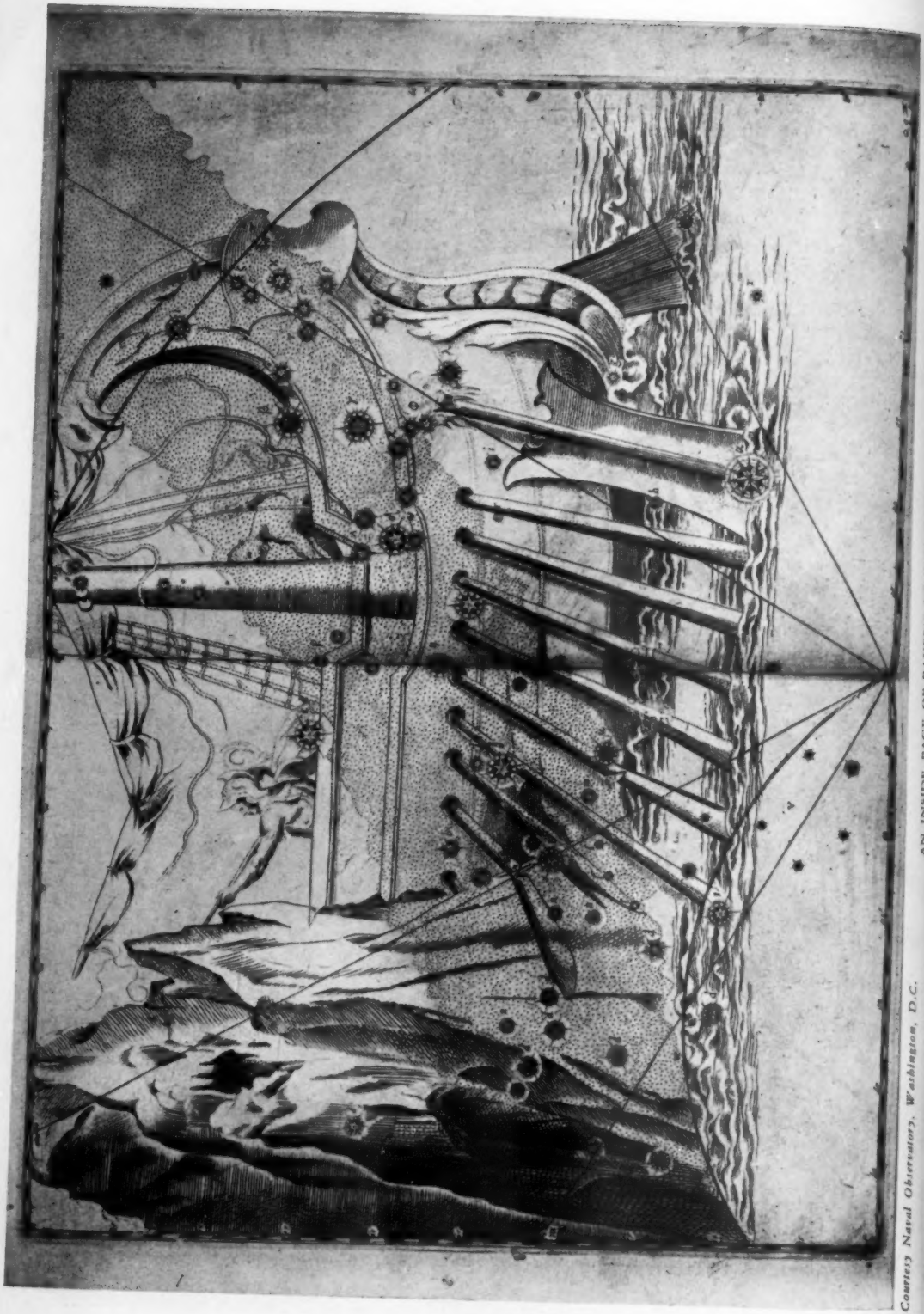
Courtesy Naval Observatory, Washington, D.C.

DEDICATION PAGE OF TACQUET'S *OPERA MATHEMATICA*

Courtesy Naval Observatory, Washington, D.C.

TITLE-PAGE OF TACQUET'S *OPERA MATHEMATICA*

UNIV. OF MICH.



Courtesy Naval Observatory, Washington, D.C.

AN INSIDE PAGE OF BAYER'S *URANOMETRIA*

Printed Treasures *in the* Library *of the* United States Naval Observatory

By GRACE O. SAVAGE, *Librarian*

SINCE the public has been showing an increasing interest in the activities of the various government departments during recent years, the practical value of the work of the United States Naval Observatory in Washington, D.C., has become better recognized. The library of this institution, however, has remained comparatively little known beyond the circle of its regular readers and too little used by research students. This is due in part, probably, to its scientific character and to its situation off the main path of tourists and even of Washington residents. Most of the visitors come at night to look through the telescopes and do not see the library. As a matter of fact, this library contains much of interest to the casual visitor as well as to the earnest student of astronomy or mathematics.

A purchase of 700 volumes of English, French, and German standard scientific publications added to a gift of 200 volumes from noted foreign observatories and libraries a year or so after the Observatory was organized in 1843, gave this library its beginning. Since that time careful attention has been given to the accumulation of valuable works, early and modern, until at present the bound volumes number about 36,000 and the unbound pamphlets about 8,000. Wise expenditure of the limited appropriations granted for the purchase of books has been amply supplemented by the accession of periodicals and monographs through exchange. In return for the publications of the Naval Observatory there are received publications of other observatories and scientific institutions in this country and in twenty-seven foreign countries.

Thus have been developed priceless sets, many of them complete from the earliest volumes to the current issues. The long foreign sets include the *Nautical Almanac* of Great Britain (complete, 1766 to date), *Berliner Astronomisches Jahrbuch* of Germany (complete, 1774 to date), *Connaissance des Temps* of France (1771 to date), *Almanaque Náutico* of Spain (1841 to date); and publications of the Royal Society of London (complete, 1665 to date), Akademie der Wissenschaften of Berlin (complete, 1746 to date), Académie des Sciences of Paris (complete, 1733 to date), and Academy of Sciences of Russia (1728 to date).

While these periodical series furnish a background of general science, an attempt is made to acquire and keep mainly works on astronomy and mathematics. The Library of Congress looks to the Naval Observatory Library to specialize in these two subjects in the great scheme of interlibrary coöperation. The result is an astronomical collection conceded to be the most complete in the world, with one exception, a library in Russia. The collection of mathematical works is internationally known and respected. Students working for doctorates are most enthusiastic over the facilities available here for studying higher mathematics.

This practical part of the library, which brings the scientific information up to the very latest printed word, is well balanced by an assemblage of over 400 early books printed before 1800. About half of these were printed between 1482 and 1700 and include many first editions and rare copies. Early editions of scientific works are intensely interesting in their physical make-up and are most valuable historically because they represent the stage to which civilization had progressed up to the time they were written.

Advanced students know from bibliogra-

AN INSIDE PAGE OF BAYER'S *URANOMETRIA*

Courtesy Naval Observatory, Washington, D.C.

phies and notes of reference the sources which must be searched in the quest of new material. Therefore, without further special reference to the value of the modern and current material available, attention is invited to the old printed treasures which bring joy to booklovers and spontaneous interest to others. The most practical person, avowedly without interest in antiques, cannot restrain the thrill that comes with the study of early books. There is a feeling of reverence connected with the idea of those old manuscripts, written by eager students of the very earliest centuries and later brought to light to be given to the world after the invention of printing. The fact that a primitive kind of printing existed for many centuries makes one marvel that the invention of printing from movable types should have been delayed in Europe until the middle of the fifteenth century.

Very little is known about the prices of these early books and the cost of printing them. It is known that many branches of industry joined in the making; one man probably wrote the book, another supplied the rubrics (titles or directions in red), a third inserted the initial letters and borders, and others the general groundwork and the rest. Some of the books have spaces left for the initial letters which were never inserted.

The earliest books have no title-page. At the end of the text is a colophon, or brief statement of the place and time of publication and sometimes the name of the printer. Not until between 1480 and 1485 did the systematic development of the title-page begin. At first there seemed to be the custom of printing a short title on the first page, then filling in the blank space beneath the title with an illustration or printer's mark, the author's name being hidden in the preface or colophon. Later the title-page became a fine piece of work ornamented with wood cuts. Wood-cut borders often surround the first page of the text and pictorial initial letters and large ornamental tailpieces appear frequently through the body of the book. Pagination, use of the letters of the alphabet for designation of signatures, and headings, believed to have been used first about 1470, had come into common use when the earliest book of the Naval Observatory collection was printed in 1482. Most early books are printed in Latin.

Two other interesting features of the make-up of these early books are the paper on which they are printed and the bindings. The paper is strong and durable, apparently made from rags by the old and intricate hand process of beating them into fibers and pulp. The age of the bindings is harder to judge. Some of them seem to be the original. If they are not, they are very old. Bindings of vellum that has become stiff and crackly or that has softened with age, those of leather either smooth and straight, or ornamented with tooling and gilt, and those of paper boards covered with old manuscripts, all are represented in this collection. Some still have clasps to hold the covers in place; others show signs of having had some kind of band. Many have been repaired by experts who have tried to reproduce the worn ornamentation. Stains and worn parts cause speculation as to how these old treasures have been valued and treated by former owners. Some contain bookplates and many bear the names of foreign booksellers.

The incunabula, as books printed in the fifteenth century are termed, are always most interesting. The very earliest in the collection at the Naval Observatory is a first edition of *Poeticon Astronomicon* (1482), by Hyginus, illustrated by Ratdoldt, who was one of the four most important printers in Venice at the last of the fifteenth century. There are first editions of *Flores Albumasaris* (1488), *Introductorium in Astronomia* (1489), and *De Magnis Coniunctionibus* (1489), all by Albumasar, an Arab astronomer of the ninth century, who maintained in the last book named that the world, created when the seven planets were in conjunction in the first degree of Aries, will come to an end at a like conjunction in the last degree of Pisces. Ratdoldt used the same wood cuts in these books that he had used in the one by Hyginus. A book of tables, prepared at the instance of Alfonso X of Spain, bears the information that it was printed at Venice in 1492. The book attracting most attention is that of Paciuoli, entitled *Suma de Arithmetica Geometria Proportioni et Proportionalita* (1494), known as the first work printed on arithmetic and according to De Morgan, the first work printed on algebra. The figures and calculations are in wood cuts in the margins. The binding, seemingly the original, has been cleverly repaired.

Included in this valuable collection are the writings of mathematicians and astronomers who lived in the first centuries, B.C., as Aristarchus, famous for having been first to hold the principle that the earth moves around the sun; Aratus, a Greek poet, who knew little astronomy but wrote poetry which attracted the attention of astronomers; Archimedes, the greatest mathematician of ancient times, noted for his inventions, and quoted as saying in connection with his discovery of the principle of the lever, "Give me where I may stand and I will move the earth"; Apollonius, whose brilliant work on conic sections caused him to be known as the "Great Geometer"; and Hipparchus, the greatest astronomer of antiquity, who is credited with the founding of trigonometry and the discovery of the precession of the equinoxes.

Noted authors representing the period of the first to the fifteenth centuries include Pliny the Second, whose writings are not scientific but are valuable to show the progress of astronomy; Ptolemy, a celebrated Egyptian astronomer, known for his *Almagest*, which formed the foundation of astronomy until the time of Copernicus; Diophantus, the only Greek mathematician who specialized in algebra; Pappus, the last of the great mathematicians of the Alexandrian school; Eutocius, whose commentaries form a history of Greek learning; Albategnius, Arab prince and astronomer of highest rank, who was the first to prepare a table of cotangents; Copernicus, Polish astronomer, who, dissatisfied with Ptolemaic doctrines, elaborated an entirely new system; and Ulugh Beg, Persian astronomer, who made the first original catalogue of fixed stars after the time of Ptolemy.

The sixteenth century brought increasing numbers of mathematicians and astronomers. The results of former scientists were being made available through the new art of printing. Some of the best known of the writers of this century who are represented in this collection are Tycho Brahe, Danish astronomer, who, while a student of philosophy at Copenhagen, marveled at the punctual occurrence of a total eclipse of the sun at the predicted time and became so interested in astronomy that he studied it secretly until his guardian uncle died and he was allowed to have an observatory of his own; John Napier, Scottish mathematician and inventor of logarithms; Henry Briggs, English mathematician, who continued Napier's work on logarithms and tables; Clavius, geometer, whose calendar was adopted in place of the Julian calendar (Gregorian calendar in Naval Observatory Library copy is worked out from A.D. 1600 to 5000); Thomas Digges, whose writings raised the standards of other writers on astronomy; Galileo, Italian astronomer, who was first to appreciate the value of the newly invented telescope for astronomy and who overthrew the idea of Aristotle that heavy bodies fall faster than lighter ones, an idea which had persisted for nearly twenty centuries; Edmund Gunter, inventor of navigational instruments; Kepler, German astronomer, best known for Kepler's laws of planetary motion; and Rheticus, who calculated a table of sines and began tables of tangents and secants which were completed and published by Otho in 1596 (it is believed that the copy in the Naval Observatory is the only perfect copy in the United States).

The seventeenth century authors include: Isaac Barrow, English professor of geometry, considered by his English contemporaries a mathematician second only to Newton (the first edition of his work in this collection is very rare); Ludolph van Ceulen, who carried the value of π to thirty-five places, causing the value of this symbol to be called "Ludolph's number"; Descartes, French philosopher, who interested himself in the development of better optical instruments; Fermat, French mathematician, who ranks as founder of the modern theory of numbers; Hevelius, German astronomer, called founder of lunar topography (the second part of his *Machina Coelestis*, 1679, in the Naval Observatory collection, is extremely rare); Robert Hooke, originator of the idea of using the pendulum as a measure of gravity; Huygens, Dutch mathematician, astronomer, and physicist, who discovered a satellite and the rings of Saturn and who applied the use of the pendulum to regulate the movement of clocks in order to get exact measure of time in observing the heavens; Sir Isaac Newton, inventor of the method of fluxions which he kept secret until the publication of his *Principia;* and Torricelli, Italian physicist and mathematician, who discovered the principle of the barometer in 1643.

Arms *and the* Man

By LIEUTENANT THOMAS J. CASEY, *U. S. Navy*

THE old saying goes that today's Navy is composed of iron ships and wooden men in contradistinction to the "old" Navy which, we are informed by the old timers, was made up of wooden ships and iron men. We, of the "new" Navy hasten to deny that such is the case; that the ships are of iron but that the men are not less so. We cannot entirely deny the fact, however, that the time, money, and intelligence lavished on the mechanical element of the Navy is out of all proportion to that allotted to the human. We cannot deny that our efforts to solve the human equation have been only perfunctory.

Before a turbine is placed on board ship we know just what its water rate will be. Before a gun is mounted in its turret we know just what muzzle velocity it will produce. But what efficiency we get from the ship's company which makes up our human machine is never determined, never systematically analyzed, almost always casually accepted.

Every June there comes from the Naval Academy a class of new officers with their brand new commissions in their hands. They come out to the service with a youthful enthusiasm, and a real, if somewhat disguised, desire to make names for themselves. They come equipped with the best that the Naval Academy can give in the way of professional knowledge, in all subjects but one. That one is usually known as "leadership," and is, in effect, the application of the principles of psychology to practice. To be sure, the new graduate has been exposed to a course in "leadership" at the Naval Academy, but in a curriculum which is already crowded with purely technical subjects the emphasis on this course cannot be very great. More is accomplished toward the ability to command—which is the function of the line officer—through association with and observation of older officers and through that potent something known as "tradition" than through the formal study of the course. This study has the salutary effect of giving the problem a name and inducing thought on the subject, and to this extent serves its purpose excellently.

The brand-new graduating class embraces among its members some who will one day be charged with executive authority over the whole Navy. What more fitting time to direct their efforts than during this most impressionable period of their careers? They come to the service well equipped in the mechanics of their profession, but with only a vague notion as to how they are to command the respect and coördination of the men with whom they will come in contact. Their only training which is formally administered is through the medium of journals in which they are required to write up certain subject matter and draw more or less interesting sketches. Here again is the emphasis on the mechanics of being a naval officer, with a total disregard of the psychological phase. Worst of all, these journals usually become odious jokes of uninspiring labor which must contain a certain amount of subject matter, a certain number of pretty sketches, in order to "get by."

It is not to be denied for a moment that a naval officer should know the mechanics of his profession, but equipped with the Naval Academy education and assuming an average amount of native intelligence, an officer with any interest in his work can assimilate these mechanical details in a short time. But in the matter of sympathetic and psychological understanding, in which most of us are weak, there is no guiding star to lead us out of the wilderness. This is the more to be deplored when it is recognized that the naval officer is ultimately much less concerned, in the function of command, with the mechanics of his profession than with his executive qualifications.

The naval officer is primarily an executive, and as such his material is composed

of men. Just as the successful business executive should be familiar with the mechanics of his business, so it is desirable that the naval officer executive be familiar with his. But primarily he must be able to direct his men efficiently, to command their respect, and to obtain their coöperation.

Since executive ability is so commonly tied up with personality, it may be thought that we are limited by the personality with which we are endowed. American history can perhaps produce no better example of dynamic personality and executive ability than Theodore Roosevelt, but he has made the statement that as he had been a rather sickly and awkward boy, he was, as a young man, both nervous and distrustful of his own prowess. He had to train himself painfully and laboriously "not merely as regarded his body, but also as to his soul and spirit" to become the commanding figure we all know. Executive ability is not born to us, it is not a heavenly bequest graciously bestowed on one and denied another, but it can be developed by training and example.

Personality is a nebulous quality which is dangled before our eyes as the vehicle of those qualities which we cannot describe in any number of words. It has become a sort of whatnot upon which are crowded the various attributes that we recognize in a man as tending to make us like him or dislike him, but which we are usually at a loss to describe. Gowin defines it by saying that it consists of those positive qualities which have meant survival to the group in the struggle for existence. It can be cultivated, and should be, by the man who wishes to become a successful executive.

Personality, then, will help us in our quest for leadership. The course in leadership at the Naval Academy will help to some degree. But in the final analysis we come down to a study of men. It is leadership of men which concerns us. It is leadership of men by men and, therefore, our study should be a study of men. Some philosopher has said that the greatest study of mankind is man. Surely one of the greatest studies for leaders of men must be the study of man.

We must understand ourselves, our own emotions and reflexes, before we can sympathetically understand those we wish to lead. Assuming that we are already conversant with the principles of leadership as such, we should try to go a step farther. Of course no amount of knowledge about the *genus homo* is going to assist us unless we keep the elementary ideas of leadership before us. We must recognize the power of example, the necessity for loyalty up and loyalty down, the value of decisiveness.

Perhaps in no other Navy in the world will such conditions be encountered which require the study herein suggested as in ours. In no other Navy in the world will such a heterogeneous personnel be encountered as far as racial derivations go as in ours. No doubt every country in Europe is represented in our Navy by at least one young man only one or two generations removed from the fatherland, and from the temperament and behavior which characterize that land. Although the battle still rages furiously between the proponents of heredity and environment as the causes of behavior, it cannot be denied that heredity plays a very large part and that the different racial characteristics are handed on to a greater or lesser degree to following generations. Nobody would dare formulate and propose a plan which could take care of all these different characteristics we may encounter. The condition is merely mentioned here that we may recognize that a definite problem exists which can be met only by a consideration of the immediate circumstances in any given case.

Although we all would like to think that we are the masters in any given situation it must be confessed that our emotions often get the upper hand. A hereditary mode of response to a stimulus which throws the organism for the moment into a chaotic state may be defined as emotional. This state of excitement tends to shade off into conditions of a relatively neutral sort, so that it is difficult to draw the line between emotional and non-emotional states. Anger, fear, hate, love, grief, embarrassment, may suggest the more vivid forms of emotion. There are many theories substantiating the various classifications of emotions but these cannot be described here. A study of any good textbook on the subject will present the idea better than it could be presented here, and this discussion must be confined more to the naval application of these theories. But whatever view we hold on the subject of emotions we must recognize that our emotional life sustains a most important relation to our conduct and character. Force-

ful characters are usually those with strong normal emotions, meeting the demands of civilization without exaggeration of these emotions. In some emergencies the cool, calm, imperturbable man may meet the situation excellently, but in general he is liable to be an unsympathetic type unable to understand the reactions of others. On the other hand there is the type of man with a very low boiling point. Any little spark at all will start his blowing off steam to the discomfiture of all concerned and to his own disadvantage. We have heard so much of the desirability of coolness in a crisis that unfortunately we are only too eager to believe that a man who is always cool is a great asset. We may have experienced contacts with the type with the low boiling point which serve to intensify this belief. Unfortunately, the man of the former type may be only a clod incapable of any fine emotion, and the man of the latter type is unpleasant because his reaction is exaggerated. Do we know ourselves? Can we truthfully say that our own emotions are normal before we attempt to lead other men by force of our example? Leadership teaches us that we should never give way to anger, that we should never display fear, but situations will arise when these two emotions are the normal reaction. Can we stifle these emotions as leadership would have us do? If the emotions themselves induce a chaotic state in our minds, as they do by definition and experience, how much more chaotic will the situation become as a result of the conflict between the emotions and the mental effort summoned to subdue them! Unless we have some training and knowledge along these lines we must wander in the wilderness, not knowing good from evil. Some reading on the subject of emotions, tending to show their cause and their place in the human scheme of things would help. Perhaps junior officers might fill their journals with reports of such reading, in place of sketches of the salt-water piping, to good avail.

Instincts, emotional and otherwise, play a great part in determining the motives of voluntary conduct. Anger, fear, love, and sympathy are important characters in the play of normal human life. Anger is one of the earliest instincts evidenced by a baby, appearing whenever appetites or desires are thwarted. Fear, like anger, is one of the earliest and most persistent of emotional motives. Love and sympathy sometimes play a predominant part. The emotions constitute an important study. They cannot be ruled out by saying that a good leader does not give way to them.

The leader should not be emotional, nor should he be unemotional. Perhaps, the best specification is that he should be balanced. A man who flies into a rage at the slightest provocation becomes an impossible and antisocial character. A man who can be aroused by no amount of insults is doomed to shame. To describe just what constitutes balance is difficult if not impossible, but it is very easy to discern just when it is missing. This condition may arise either from the exaggeration or suppression of one of the instinctive groups. Before trying to lead others we should, then, analyze ourselves.

The leader is in an excellent position to derive power through the emotions. The train wreck, the great fire, any moment of great emergency produces its heroes out of what would otherwise seem common clay. But in every-day life the leader may enjoy to the utmost the instinct of constructiveness. He derives a profound pleasure from the satisfaction of this instinct when he watches his orders carried into effect, his theories put into practice. In other words the normal man has normal, balanced emotions which should not be strangled nor yet exaggerated.

The problem of the executive is to motivate the men under him by stimulating them and controlling them in the performance of what he wishes done. His chief business, therefore, is "to organize, deputize, and supervise." The function of deputizing is not the least important, because more than one leader has failed by trying to do everything with his own hands. This fact is often unappreciated and lies at the bottom of many a leader's trouble. The commanding officer who usurps the duties of the engineer officer must neglect something else of vital importance to find the time for this usurpation. The chief boatswain's mate who supervises the hoisting of a boat makes a failure of it when he insists on running the winch himself and passing the stoppers. While he is thus busily engaged some seaman second gets his fingers tangled in a block and utter confusion reigns. The leader

holds himself aloof from the actual performance of the task in hand, and devotes his efforts to stimulating and controlling the mechanical efforts of others.

This is all very well. We are disposed to accept the foregoing statements with a shrug and a mental note of "old stuff." It must be borne in mind that the efforts of the executive or leader are only a means to an end. We cannot stop when we have followed out what we consider to be the correct course and assume that our job is done. We cannot shed our responsibility like the boatswain's mate who "passed the word," until the desired effect has been produced in our subordinates. We cannot bombastically apply the principles of leadership and expect the results just to happen any more than a mechanic with a sixteen-pound sledge can produce music by striking indiscriminately, albeit forcefully, on the keyboard of a piano. The correct touch is necessary to produce the melody of accomplishment. The executive's work is only a means to an end; the real substance is in the effect produced upon the subordinates. Therefore we must know how to apply the principles of leadership, and to attain this knowledge we must know ourselves and our own instincts and emotions, in order to understand the reactions of those whom we lead.

A very definite problem confronts the officer who would be a leader—and what officer would not? We should not only be able to understand the normal man but also the abnormal. Consider the following amusing incident. The captain of a destroyer during maneuvers did not believe that the man on the throttle was responding to his signals with the correct number of turns, and he went to the engine-room voice tube himself to ascertain just what was wrong. He rang furiously on the call bell and upon receiving a response from the engine-room shouted, "What are you making?"

"A dollar a day," came back the immediate response.

No doubt the above answer would seem quite laughable under some circumstances, but it happened that the man who made it was a "queer duck," always getting into trouble. Should such a reply have been overlooked, laughed off, or made the basis of a more or less serious charge against the throttle man?

The executive must keep in mind that it is his part to release energy stored up in others. He must know how to strike a responsive chord which will produce the melody of concerted action, and not attempt to pound and force upon the exterior. He will usually meet with coöperation, thanks to the sociological fact that Americans are intense believers in activity and effort. To avail one's self of this coöperation and release the energy lying dormant or poorly concentrated in those whom we lead, many ways are available. The desirability of having a good record, the certainty of reward for labor performed, may be held out to our followers as a means of releasing this energy. Best of all is the well-recognized principle of leadership to be as liberal with public praise as with condemnation. In the words of Professor James, "We are not only gregarious animals liking to be in the sight of our fellows but we have an innate propensity to get ourselves noticed and noticed favorably by our kind." The true source of organized energy is in the minds of subordinates and we must employ the means which will best release it.

Imitation has its basis in our social structure in that the superior is always imitated by the inferior. Luckily it is a human presumption that whoever holds a position of superiority is really superior, and as such is imitated. There are tremendous possibilities in this one fact which the leader can use to his advantage or disregard to his destruction. It is an elementary hypothesis of leadership and should not be overlooked. The superior must be clothed with a certain amount of prestige in the eyes of his subordinates, and the fact is that the subordinates themselves will build up this prestige from their impressions of the leader. If properly handled they will pick out the fine points and enhance them, and sometimes make quite an improvement on the actual person, in distinguishing between what he actually is and what they think him to be. Such a man will enjoy all the benefits of prestige and be imitated and idealized. But this practice of imitating ruins originality and individuality, it might be said. It is a sad commentary, but only too true, that "most of our mental furniture is borrowed." We will insist that a certain cigarette does not irritate our throats because "there isn't a cough in a carload." We will insist that another brand satisfies because for years

beautiful girls, riding in snappy roadsters under a low swinging moon, have been shouting it to us from billboards and street-car advertisements. We will all stand up and defend democracy as the best type of government although most of us have never taken the trouble to get authoritative data on the subject. We should not be too jealous of our individuality. Even imitation, however, must be controlled, and controlled through the mind. The executive must first win the minds of his followers before he can enlist the power of imitation on his side, as imitation made compulsory is an empty shell.

In bending many to the will of one, discipline has been and must always be a factor of great importance. Although the more theoretical may claim that more can be accomplished by the elimination of discipline with its attendant threat of punishment, the theory does not hold water when set afloat on the sea of experience. The mailed fist is sometimes indispensable, sheathed though it may be in its velvet glove. But here many an executive encounters tragedy, for discipline is a two-edged sword which must be handled with care. We are all familiar with the rules-of-thumb concerning discipline—that it must be strict, that it must be impartial, that it must be swift and sure. With some men a public dressing down may produce a greater sense of guilt and repentance than hours of extra duty. In some cases it is wise to keep the misdeed quiet. "The organization which apparently runs smoothly by its seeming harmony tends to make these indications a reality."

Throughout this article intelligent understanding of the situation is emphasized. After all, intelligence may be said to be nothing more than the ability to make an accurate estimate of any given situation and to prosecute the decision adopted to a satisfactory solution. The attempt has been made to get away from the platitudes of leadership, as such, and to suggest an approach to our subject through the province of the mind. We are, in general, too eager to attain the ends to be bothered with the means. We are inclined, if we think of the subject of leading men at all, to accept the experiences of others and the generalization of these experiences, rather than to approach the subject from the ground up. John Dewey says that "it is impossible to form a just estimate of the paralysis of effort that has been produced by indifference to means." Since we must concede that the leading of men is a mental act rather than a physical one the proper means to secure this end must be mental. We must approach through the mind, first unraveling our own minds and laying them out in logical order where we can see how the pressing of one mental button summons a certain mental response. Understanding ourselves—as nearly as we mortals ever can—we are well on the road to understanding others. Without this understanding we cannot lead intelligently. We can only blunder on, those who are born leaders achieving success, those who are mediocre remaining so, and those who have no conception of the problem doing themselves and the service incalculable harm.

The argument is usually advanced that experience will point the way to success as a leader. But what a shame that this experience must be gained at the expense of real, live specimens, instead of in a laboratory! Given enough time most of us would make pretty fair seamen, but we are not put in charge of a ship until we have had ample opportunity to obtain the necessary experience by observing others.

It would seem logical that naval officers, who must be leaders and not doers, should get some exposition of the fundamentals of the art of leading, if for no other reason than to suggest a definite line of individual study. Just where in the naval officer's career this exposition should take place could best be decided by those charged with the responsibility for training officers, but there is no doubt that there is a crying need for it in the Navy today. The mechanics of being a naval officer are amply covered but the psychology is woefully neglected, to the detriment of the organization.

Arms and the Man! They have ever been linked together, and of the two the Man is the more important. Man himself is a complicated mechanism which does not follow the ordinary laws of mechanics. Man is the only mechanism in the Navy which is not duly analyzed and described in bureau instructions. Man is a complicated mechanism, but a group of men is an even more complicated mechanism. Arms and the Man! Let us not forget the Man!

The Trial *of* Lieutenant Ridgely *for* Murder

By Rear Admiral Livingston Hunt *(S.C.), U. S. Navy (Retired)*

WHEN Commodore Preble was ordered home from the command of the Mediterranean squadron, and before he was relieved by Commodore Samuel Barron in September, 1804, he forwarded to the Secretary of the Navy a report of the operations of his famous squadron in which, among other things, he stated the following fact: "It affords me much satisfaction to observe that we have neither had a duel nor a court-martial in the squadron since we left the United States." Commodore Preble did not know that in a short time there was to be a trial by a civil court of one of his promising young officers whom he had especially commended to the Secretary of the Navy, and a trial of an extraordinary character, of which we shall now give an account.

On board the little U. S. schooner *Nautilus* of the Mediterranean squadron, of 185 tons, 12 guns, and 103 men, commanded by Lieutenant John H. Dent, there was serving in January, 1805, an acting lieutenant, Charles Goodwin Ridgely, of Baltimore, only twenty years old, and already familiar several times over with the ordeal of battle. In the preceding August and September he had fought by the side of the immortal Somers in Gunboat No. 1 in five actions, and had earned the official praise of that officer. Somers and James Decatur had both been Ridgely's intimate friends and shipmates on board the *Nautilus*, and both had been killed in war; so that Ridgely's youth had already passed through more than its share of life's experiences. Commodore Preble had on August 19, 1804, promoted him from midshipman to acting lieutenant for his gallantry in action; and the episode in his career to be here related must in no wise affect our estimate of him as an officer who for the rest of his life was to deserve the right to be considered a man of character and high professional ability. The various papers hereinafter quoted were recently discovered among the original manuscripts of the Navy Department, in a search which was made in order to learn the truth in regard to a charge which had once appeared in print some years ago that Lieutenant Ridgely had in his youth been formally accused of no less a crime than murder. The interest in the search grew with the discovery of one trace after another until a complete story was picked out from the manuscripts known as the "Captain's Letters," vols. 2 and 3, 1805, and vol. 1, 1806.

The *Nautilus* found herself on the evening of January 23, 1805, at anchor in the port of Messina, Sicily. Here Lieutenant Ridgely decided it would be a pleasant diversion to give a small dinner on shore, and he invited his shipmates, First Lieutenant George W. Reed and one or two other officers, to be his guests. The dinner, with the accompaniment of much merriment and much drinking, took place. After this pleasant event, and while Ridgely and Reed were strolling, not too steadily, about the plaza in Messina known as the "Marina," they observed a small crowd of noisy, ruffianly looking Sicilians pressing about a foreigner, threatening to do him bodily harm. The object of their roughness was speaking English, and Ridgely, who was in uniform and wearing side arms, suddenly took it into his young head to jump into this row by drawing his sword and by commanding the Sicilians to leave the man alone. The details as to how Ridgely rescued the man, who turned out to be a mate on a British naval transport, by the name of George Hutchinson, will appear later in Ridgely's story. The baffled Sicilians,

who had evidently been prepared to do in their victim, perhaps because of something he had done to displease them and also because of a general hostility of the moment to all foreigners, were frightened into abandonment of their plans by the sword, and probably by the oaths of Lieutenant Ridgely. The anger of the latter may well have been heightened by the recollection that it was not the first time that an English-speaking person had been attacked by Sicilian roughs, for his own friend and recent commander, the lamented Somers, had once, when on shore at Syracuse with two other officers, been set upon by five Sicilian soldiers, and in the struggle which ensued Somers had with his own hand run a sword through one of his assailants.[1] Anyway, the immediate effect of Ridgely's truculent interference with the roughs was that they scattered, and the English mate was left to himself. The affair apparently was over and the American officers later returned on board their ship.

Over? Not by a great deal, as we shall see. The next morning, what was the stupefaction of both Reed and Ridgely when the news was brought off to the *Nautilus* that the English mate, Hutchinson, had, after all, been foully murdered in Messina on the night before? The feelings of Ridgely, who had been the active one in the brawl on the Marina, were destined to turn into dismay when on the following morning a letter in Italian was delivered to his commanding officer by the governor of Messina, the Cavaliere Giovanni Guillichini, which letter is here translated as it appears today in the files of the Navy Department.[2]

SIR

It appearing from the enquiries which I have caused to be instituted, that two Officers belonging to the Schooner *Nautilus* under your Comm[d], are the Authors of the Homicide committed on an English Subject at the Marina of this Port, on the Evening of the 23[d] instant, I do therefore and in compliance with the pressing instances of Don Giovanni Bomester, His Britannic Majesty's Consul here, request of you Sir, to take those steps which in like cases are prescribed for the punishment of the Delinquent as well as the satisfaction of the injured party by delivering up into one of the Castles of this City the perpetrators of so cruel a Murder.

With Sentiments of perfect Consideration, I have the Honor to be

Sir

Your Devoted & Hble Servt

(Signed) CAV; GIO GUILLICHINI

MESSINA 25 Jany 1805

To

John H. Dent Esq[re]

Comm'g the American

Schooner *Nautilus.*"

The strange situation of affairs thus brought suddenly into the life of Lieutenant Ridgely by this letter and its sequences can be better understood by the explanation that the smoldering resentment of the Sicilian cutthroats with whom he had interfered on shore had developed quickly into a double determination, on their part, first to make away with the English object of their hatred, and next to punish the insolent foreign officer who had dared to draw a sword upon them. There were ten of these men, and ten perjuries meant nothing to them, provided they could torment and destroy Ridgely by putting upon him a murder which they themselves had committed. Their design was helped by the fact that he had worn side arms; and it was also further helped by the additional fact that in those days no dinner party of naval officers on shore—both in the British Navy and our own—was considered an agreeable or proper form of entertainment unless cheered and dignified by the conviviality that went with the deep drinking of healths to one's president or sovereign, one's country, one's commodore, one's captain, one's ship, and finally to "each other and one other." In other words it was a time, in both navies, not only of fierce fighters, but of deep drinkers.

And here we will put the reader right into the midst of our story by inserting next the letter written by Lieutenant Ridgely to his commander in chief, Commodore Barron, on April 13, or nearly three months later.

U. S. S. *Nautilus*

Malta April 13 - 1805

Mr. Chas G. Ridgely

To Commod. S. Barron

SIR:

From the information receiv'd this Evening from Captain Dent that you are only waiting for a demand from the Neapolitan Government for

[1] Vide Cooper's *History of the Navy*, 1839, vol. II, p. 53, note.

[2] The exact spelling and capitalization of the time and of the individuals concerned are reproduced in this and the later-quoted letters. Variations, or misspellings of the proper names are noticeable.

me & then will give me up is the cause of my now writing you.

Had I supposed that the business wou'd have been carried so far, I should not have hesitated in giving myself up, but thought I would wait your opinion on my Arrival at Syracuse from Messina relying on your Judgment and not wishing to be too premature; if you had then told me the propriety of giving myself up, I certainly should have done it, but on the contrary, your not thinking it proper at that time led me to suppose that by my returning to America the thing would have been entirely hushed up. As the Business has gone so far as to place you in disagreeable Circumstances, I am very willing to give myself up for Trial at Messina (provided you think proper) feeling perfectly conscious that I never committed a crime in my life that could cause me the least uneasiness. That I am innocent of the death of that Man, I am convinced within myself, and hope to be able to convince every person so, but allowing that I was the cause; from having some Gentlemen to dine with me, I drank too freely of Wines and Cordials, as to make me in an entire State of inebriety; And never did I know that I had injured the Man in the least until I was informed of it next Morning by Captain Dent; his informing me that the Man was stabbed by an American Officer, Mr. Read & myself being together that Night on shore, and his not having Side Arms with him, made me conclude if he was injured by one of us, it must have been me. - - I beg leave to mention to you that Spirituous Liquors I scarcely ever drink, have been intoxicated but seldom during my life, & then being in a party of young Men where I was necessitated. - - Mr. Read who was with me all the Evening & was with me when the accident happened did not himself know I had injured him until he was informed of it the next Morning, and he says that he recollects every thing that took place that Evening. - - As for myself I feel not the least fear from any punishment they can inflict, my Conscience being perfectly easy that I am innocent of anything criminal; but my Mother, my Brothers and Sisters & my relations in general, 'tis for them I feel, knowing what great distress it will cause them, when they hear what has happen'd me; But Sir as the business has gone so far I am very willing to come forward for Trial, to reestablish my Character (as I am now convinced that it must be injured from the cause of my accusation) & hope Sir you will make use of every influence in your power in my behalf.

When I saw the Man that Evening he was surrounded by ten or twelve Men, two of whom had him by the Collar, & seeing him in a Mob, & hearing him speak English led me to suppose (as I remark'd to Mr Read) that he either was an American or an Englishman in a scuffle with those Sicilians, and went off for the purpose of rescuing him, which I did & then let him go after talking with him about ten minutes, & so far from supposing that I injured him, thought on the contrary that I had been of service to him in getting him out of the hands of those fellows, but next Morning was informed the Man was dead, & those very fellows who I drove from him, had taken their Oaths that I killed him. - -

I have stated to you Sir every thing that happened & wait entirely your Commands. - -

I have the Honor to be with deference,

Your obedient Servt,

(Signed) CHA^{S} G. RIDGELY."

Here let us call attention to the good sense, manliness, and frank penitence of this letter, also to its tone of maturity in a young man not yet twenty-one years of age.

The fiendish plan of the Sicilian plotters, however fantastic it may appear today, was not, in the sequel, without success in causing genuine distress of mind to their intended victim, as we can perceive by many expressions in his letter to Commodore Barron. The commodore was much troubled as to what course to pursue in regard to surrendering Ridgely to the custody of a foreign power, and for months he hesitated to comply with the request of the governor of Messina, meanwhile having detached Ridgely from the *Nautilus* and ordered him on board the U.S.S. *Congress*, to remain in confinement under Captain Stephen Decatur. On April 29 Captain Decatur wrote the following report to Commodore Barron:

U. S. SHIP *Congress*
Messina April 29, 1805.

Captain S. Decatur jr
To Commod. S. Barron.

SIR:

I arriv'd here on the 24th after touching at Syracuse to obtain Pratique. - -

I am happy to inform you there is no doubt that Mr Ridgely will be acquitted of the charge; He is still on board the Congress, where the Governor has been good enough to permit him to remain until the Ship is about departing, when he will be comfortably lodged in the Citadel. - -

Mr Broadbent's[3] influence with the Government as well as with the English Consul & Merchants here is great, all of which he has exerted on the present occasion - - from what I have observed I feel it a duty to state to you Commodore that had not Mr. B. interested himself in the manner he has, the decision of the Tribunal would have been widely different from what there is no doubt it will now be. - -

I have been waiting for a Wind to carry me thro' the Straits two days - - the moment it comes I shall dep't.

I have the honor to be

Sir!

Your Obedient Servt,

(Signed) STEPHEN DECATUR JR.

The delays of the Sicilian law kept Ridgely confined on board the *Congress* un-

[3] John Broadbent was the U. S. consular agent at Messina, and was by religion a Quaker.

til May 6, when Captain Decatur delivered him up to the civil authorities on shore to be confined in a prison known as the "Citadel." From this prison on May 26 Ridgely writes the following letter:

CITADEL Messina 26 May 1805.
Mr. Charles G. Ridgely
To Commod. S. Barron.
SIR:

The *Congress* frigate Captain Decatur sailed from this place on the 6 of the present Month, on which day I left the frigate & was confined in the Citadel of Messina; my confinement is not very close, having permission to walk thro' the Citadel two or three hours every day. - - The Governor had written to Palermo, to know what Tribunal was to take Cognizance of my Offence; (there being two Tribunals, the one civil, the other military) from Palermo they referred to Naples & receiv'd an Answer To-day, that the military Court will decide the affair. - - Mr Broadbent intends waiting on the Judge today, to know whether he will admit me to bail, & to expedite the business as much as possible. - - I shall make use of everything in my power to get the affair settled as expeditiously as possible, but it is impossible to say when it will be settled, these Sicilians having a great deal of form in all their transactions. - - With pleasure I inform you of the active part Mr Broadbent has taken in my affair, & it is to him I am indebted for the lenity I receive in my Confinement. - -

I am in hopes to be able to leave Messina in the course of two or three Weeks, & will make all haste to put myself once more under your Command, and shall endeavor to make my Conduct for the future deserving of your Approbation. - - I have the Honor to be with Respect

Your obdt Servt,
(Signed) CHAS. G. RIDGELY.

By the seventeenth of June we know that the trial had already begun, for Mr. Broadbent thus writes to Commodore Barron:

MESSINA 17 June 1805.
John Broadbent Esqre
To Commod. S. Barron.
SIR:

Mr Ridgely's Trial is now in a very good train & I have not the least doubt but he will soon be able to return to the Squadron. - - It is to be hoped that this misfortune will be of Service to him for the remainder of his days, & that it will make some impression also on the minds of other young Men in the Service, inducing them to guard against the vice of Intoxication, particularly when they are on shore in foreign Countries. - -

His Sicilian Majesty has declared himself highly pleased with thee, in recommending the young Man to present himself in the very honorable way he has done for Trial, and had the facts and depositions been so strong against him as necessarily to condemn him, I am certain that the King would have pardoned him, having prohibited the Tribunal from executing any Sentence upon him without knowing first His Majesty's pleasure.

Thy friend
(Sign'd) JOHN BROADBENT

Months were to crawl by, most trying for the impatient and guiltless young prisoner, whose genial and attractive person (for such it was, as attested all through his life by his brother officers), arouses our sympathy as we picture him forced into inaction and gloomy reflection.

Meanwhile, what had Commodore Barron, who was in ill health and greatly worried by this whole affair—what had he been doing in regard to it? The following report from him to the Secretary of the Navy will explain:

U. STATES FRIGATE *President*[1]
at Sea August 24, 1805.

SIR:

I have the Honor to transmit you under Cover of the Present sundry papers relating to the Situation of Mr Chas. G. Ridgely, an acting Lieutenant lately attached to the U. States Schooner *Nautilus*, with some particulars of which report may probably ere this have made you acquainted. Nothing Sir is more distressing to the feelings of a Commander than to be under the necessity of representing in the language of regret and censure the Conduct of those serving under him; more especially when that Conduct is not confined to the faults of the Individual but tends to commit the reputation of the Service & the National honor - - the occurrence to which I allude is one of those which imposes on me this unpleasant duty. - - The Letter annexed of 13 April from Lieut. Ridgely with the demand of the Governor of Messina addressed to Captain Dent will best explain the circumstances of this unhappy affair, to these therefore I beg leave to refer you without entering into further details as to the facts; I conceive it proper however officially to acquaint the Navy Department that on a view of the nature of the offence complain'd of & the formal Demand of Governor Guillechini, I felt myself called upon by every principle of right & justice no less than the acknowledged laws & usages among civilized Nations to deliver up the Officer in question to a judicial investigation. It will be seen by a reference to the accompanying papers that this determination was not form'd without due & sufficient deliberation, & that it was chearfully acquiesced in by Mr Ridgely himself, who while he strongly asserted his innocence of the crime laid to his charge, felt in common with myself & the Officers of the Squadron in general the necessity of coming forward & publicly clearing his own Character as well as that of the Service from the imputation of an act, so heinous in itself & so abhorrent to Society; In consequence of this determination, I placed him in

[1] This report was written on the U.S.S. *President* after Commodore Barron had turned over the command of the Mediterranean Squadron to Commodore John Rodgers and while the *President* was homeward bound.

charge of Captain Decatur comm[r] the *Congress* frigate (who was instructed to touch at Messina on his way to Leghorn) & having the highest confidence in the judgment of that Officer, who interested himself warmly in the matter, I left the management of it to him. At the same time I addressed a Letter to Mr Broadbent our Agent at Messina, the respectability of whose Character & standing in life joined with a great share of active benevolence constituted him a fit Advocate on such an occasion, recommending the young Man in the most impressive terms to his friendly protection, & earnestly soliciting the exertion in his behalf of the powerful influence which he possesses with Individuals & with the Government.

. . . . . .

You will perceive by my Correspondence with Commodore Rodgers that at my suggestion he sent the *Nautilus* to Messina immediately after Peace was concluded, in order that Captain Dent & his Officers might appear on the Trial & render all the assistance in their power; Her return was hourly expected when the *President* left Syracuse, & I doubt not but the Commodore will make known the issue by the earliest Conveyance.

It is not without deep reluctance that I make this Communication to you, the subject of which is the more painful as Mr Ridgely's general Character is in every respect deserving of the Esteem of his Brother officers—active, brave and generous, he has given flattering indications of those qualities which matured by experience wou'd form a valuable & distinguished Officer, and I cannot sufficiently lament that in an imprudent hour he should bring me as Commander of the Squadron into circumstances productive of so much difficulty & anxiety, & himself into a Situation which might have annulled the promise of his early years, & placed an insuperable bar to his future advancement and fame; I hope however that an honorable acquittal will dissipate this cloud & restore him again to the Service of his Country, and it is greatly to be wished that He as well as other young Men in the Service may not remain unadmonished by this unfortunate occurrence, which should teach them to be more upon their guard when on shore in foreign Countries, where it becomes them to consider that they are not the Depositaries of their own reputations only, but of the reputation of the Navy, and the Honor of the Nation whom they represent.

With great Respect & perfect Consideration I have the honor to Subscribe myself,

Sir,

Your Mo. Obt. Servt.,

(Signed) SAM[L] BARRON

To
The Honble R. Smith
Secretary of the Navy of
the U. S. of America.

The anxiety of the commodore would have been lifted from his troubled soul if he could have foreseen the existence of the following letter, to be written to his successor in command of the fleet by the gentle Quaker, Mr. Broadbent:

MESSINA the 24th Sept[r] 1805.

DEAR SIR

I have now the pleasure of transmitting thee, an authenticated copy of the sentence pronounced by the Tribunal appointed by His Sicilian Majesty for trying L[t] Charles G. Ridgely of the accusation brought against him, as Author of the homicide committed upon the person of George Hutchinson, which sentence declares his innocence & restores him spotless to his Country, to his family and to thy esteem.

Notwithstanding all the severity of the Criminal Code of Sicily, the ability of the fiscal advocate, and the cunning made use of by him in the prosecution of this affair, not even the shadow of a proof has been brought against him; indeed his having voluntarily come forward to demand his trial redounds highly to his credit as a young man of honorable principles and jealous of his reputation and was from the beginning a strong Omen of his Innocence.

With the sincerest regard,

I have the honor to be thy most obedient and very humble Servant,

(Sign'd) JOHN BROADBENT

John Rodgers Esq[r]
Com[r] in Chief of the
U S Squadron in the
Mediterranean

Here comes to an end this interesting and unique—even if not very important—incident. Ridgely was restored to duty and ordered to the *Constitution* by Commodore John Rodgers. Three months later he received news from Baltimore that his presence was required there in connection with the settlement of some property which had been left to him, and he wrote a letter to Commodore Rodgers requesting permission to sail for home, in which he thus refers to his Sicilian escapade:

I will not trouble you again with a repetition of my reasons for desiring to return to relieve my mother's anxiety for the unfortunate affair in Messina.

Commodore Rodgers granted the desired request, but before Ridgely departed, he wrote to the Secretary of the Navy as follows:

From a personal knowledge I have of Mr. Ridgely both as a Gentleman and Officer, I am not only authorized by his merely having done his duty but bound in common justice to his merits to recommend him to your Notice as a young Man deserving well of his Country.

A few more remarks on the officer who, after the lesson learned in his youth which has been here described, became a well-known commodore in the Navy may not be amiss. He had not the good luck of some of his colleagues in the War of 1812, for he was stationed on Lake Ontario in com-

mand of the U. S. brig *Jefferson*, where he never succeeded in his efforts to bring a British ship to action. In 1822 on the Pacific station he joined with the British Navy in protecting the rights of foreigners in Peru, where he became the friend of Commodore Sir Thomas Hardy, R.N., Nelson's Hardy. In 1833, he was made a member of a board to revise the laws and regulations of the Navy. From 1833 to 1839 he commanded the important navy yard at Brooklyn, New York. During this period he was well known for his hospitality. New York society in those days liked to gather at the fine old house of the commandant with its colonial rooms and verandas, its architectural dignity and spaciousness. In Mr. Philip Hone's diary we find him mentioned. Later we find him in command of the Brazil station on his flagship, the frigate *Potomac*. In 1846 Fenimore Cooper, writing of the band of officers who had fought so desperately under Preble in the war with Tripoli, remarks: "Of all these gallant young men Ridgely alone survives."[*] In 1848, in his sixty-fourth year, he died in his native city of Baltimore, where to this day his memory is cherished.

In this well-behaved age, perhaps the blunder of his youth may loom rather large; but so will the valor of his youth in this, and in other ages.

[*] *Lives of Distinguished Naval Officers*, Phila., 1846, vol. 1, p. 91.

Salient Features *of the* Law Maritime

By CAPTAIN K. C. MCINTOSH *(S.C.), U. S. Navy*

I

FOR the conduct and regulation of affairs on shore, two great legal systems prevail among the white nations: the Common Law of England and the Roman Civil Law. The brown and yellow nations as a rule follow slightly varying forms of the Old Law of China.

Commerce and navigation of the seas, however, are under one general, world-wide code, the Law Maritime, usually called "Admiralty" among English speaking peoples. Its minor ramifications vary in different parts of the world. Each country has legislated for its own merchant marine; but these national variations are practically confined to such matters as "full crew laws," employer's liability, slop-chest and lime-juice regulations, radio, etc. The enduring backbone of admiralty law is the same everywhere, practically unchanged for centuries.

Admiralty was first codified for the English by Richard I in a book called the *Rules of Oleron*. King Richard assembled the materials after his return from the Crusade. He had them from the Saracens, who had had them from the Greeks, who in turn had had them from the Phoenicians in the days when Odysseus was challenging the monopoly of Tyre in Mediterranean markets.

In this country, only Federal courts have jurisdiction in admiralty cases, and appeals must lie with the Circuit Courts of Appeals. The Supreme Court has supervisory jurisdiction.

Many cases are on the border line between admiralty and common law. Such cases may be tried in state courts, if common law covers the point at issue. Admiralty, however, is as remarkable for its direct effectiveness and celerity as common law is for its intricacy and delay. Shipping controversies, moreover, are frequently between citizens of different states. As result, suit is brought in admiralty whenever possible.

The first test of possibility is: Does the matter at issue concern a *ship?* If so, the law maritime applies. If not, common law must be invoked. Naturally this leads to the question, "What is a ship?"

First, it must be a *complete* ship. While on the stocks or in the fitting basin, she is not a ship. In commission, while engaged in commerce or navigation, admiralty has exclusive jurisdiction. As she becomes decrepit or is wrecked, that jurisdiction gradually weakens and ceases when she is broken up.

Then the next question is: "What sort of completed floating structure can be called a 'ship'?"

The *Revised Statutes* answer this question by the words, "Every description of water craft or other artificial contrivance capable of being used as a means of transportation by water." The sweeping and sketchy technique characteristic of national legislative bodies is here apparent. That description includes a shaped pine log. "Other artificial contrivance capable" could be held to include a woodshed adrift on a Mississippi flood. So following the Act of Congress we have this rule of court:

> The true criterion by which to determine whether any water craft or vessel is subject to admiralty jurisdiction is the business or employment for which it is *intended*, or is *susceptible* of being used, or in which it is *actually engaged*, rather than size, form, capacity, or means of propulsion.

Under this rule it has usually been held that a dredge is a ship, that a floating bathhouse is a ship unless it is permanently moored; that a solid crosstied raft built to transport the lumber it contains, and manned by a crew is a ship; but that a loose run of logs down navigable water is not a ship.

This decided, arises the third question: "Where does admiralty apply?"

Three sorts of waters are included in its jurisdiction:

(a) The seas.
(b) Streams where the tide ebbs and flows.
(c) Waters which carry a substantial water-borne commerce, which includes great lakes and rivers.

A navigable stream may lie entirely within the borders of a single state, yet it will be included in admiralty jurisdiction. The nice question here is to prove whether or not a given stream is "navigable." The only known test is the stream's ability to carry a "substantial commerce," and that is not yet accurately defined.

The subject matters of admiralty jurisdiction are maritime contracts and maritime torts. There is no such thing as a "maritime crime." Crimes committed at sea or in navigable waters are punishable by the courts having admiralty jurisdiction when the Federal Law provides for such punishment; but normally they are punishable by the state having sovereignty.

A contract is maritime only when it relates to a ship as an instrument of navigation. This does not mean that it must be made or concluded in a ship or on navigable waters. The best criterion in judging whether or not a contract is maritime is the system of law from which it arises. Insurance, for instance, springs from the law maritime. Dower or partnership do not, although the contract may have been concluded on the high seas between seamen.

A tort is a wrong where no contract is involved; a breach of duty imposed by law, not a breach of contract. Consequently, the character of a tort is of little value in determining whether or not it is maritime. The test here is purely a territorial one: it must be committed on navigable waters. A case in point was a wharf and warehouse kindled by a burning ship and destroyed. The fire started upon navigable waters, but the wrong was committed on shore, and admiralty had no jurisdiction.

Now in the above case, against whom would action be brought—the owners, the operating manager, the directors, or the master? In the answer lies the reason why partnership is not a maritime contract. The suit would lie against the ship herself, unless she were so completely burned as to be a ship no longer, in which case it would be brought against those persons standing in lieu of heirs and assigns. The ship is a distinct person to even greater degree than a corporation. She cannot appear in court and must be represented by an attorney; but she is visible and tangible, and can of herself commit a wrong without human agency.

In the famous *Hawk-Olympic* case, suit was brought by the steamship company against H.M.S. *Hawk*, not against the Admiralty. Counter suit was brought by the Admiralty against SS. *Olympic*. In this case, the human owners and masters, in the then state of knowledge, had committed no wrong or error. The *Olympic* herself was to blame, and the *Hawk* was helpless. However, the trial brought out the danger of steering in the wake of a great liner; and such a case occurring now would be held negligence on the part of the small vessel's master.

Under such circumstances, men cannot be held to too strict an account for a ship's behavior, so the manager (who to this day is known legally as "ship's husband") is required only to exercise "due diligence," etc., while owner's liability is limited to the amount of investment. If the owners like, they can clear themselves entirely by surrendering the ship to the claimants, passing title and making the ship pay her own bill.

The law maritime endeavors to accomplish justice between litigants with the greatest possible brevity and speed. It follows equitable principles almost to the degree of Solomon's sword proposing to divide the child. One of its earliest tenets, then, is the doctrine of general average, which has been defined as "a partial loss, voluntarily incurred for common safety, and recompensed by all who are benefited thereby." General average is older than any known written speech and is probably antedated only by the codes of domestic relations and real property.

II

In order to obtain the benefit of American registry and consequent right to trade between ports of the United States, the ship must, under our laws, be owned and commanded by American citizens. A corporation created under the laws of any state is to a certain extent, a citizen in itself; and in case an American corporation is owner, it is not required that all stockholders be citizens. A single owner, or a partnership who are owners, must be American citizens,

and in any case, so must the master. The word "citizen" in this connection does not imply enfranchisement. Minors, married women, and persons under guardianship have always been legal owners; and, if they can comply with the rules, masters. Captain Barney of 1812 fame was a duly qualified master four years before he ceased to be legally an infant.

Title in a ship may be passed in the easy manner of personal property, by simple delivery. It is not necessary that there be any written evidence such as a bill of sale. However, in the United States documents proving title are vital to registry, so the more formal methods of passing title are practically mandatory.

All ships of over twenty tons must be registered. Eight classes of vessels are entitled to American registry:

1. Vessels built in the U. S. and owned by a citizen.
2. Vessels captured in war, condemned as prize, and owned by a citizen.
3. Vessels forfeited and sold for breach of U. S. law and purchased by a citizen.
4. Properly certified and inspected vessels, built anywhere, owned by citizens, or by corporations whose president, directors, and holders of control are citizens, to engage only in foreign trade.
5. Vessels wrecked in the U. S., bought by citizens, and repaired at a cost of at least three times the appraised value of the wreck.
6. Shipping Board vessels sold to a citizen.
7. Steamboats employed in a river or bay of the United States owned wholly or in part by a resident alien.
8. Yachts owned by citizens and used for pleasure only.

Sale of a ship which will place her within any one of the above classes will entitle her to registry. Sale outside of these classes will void her right. Following the rule of personal property, sale by owners or trustees and administrators does not exempt the new owner from liens existing at the time of sale.

Sales "in admiralty," ordered by the court through process of litigation, pass absolute title, exempt from any lien or encumbrance. If the sale clause of a preferred mortgage deed be properly observed, sale after foreclosure also passes clear title.

Under stress of circumstances, when unable to communicate with his owners and in his best judgment it is to the owner's best interest, the master may sell a ship and convey a clear title. When the master lawfully sells a ship, all liens are divested, even if no bill of sale is executed.

III

The ship's husband, or managing owner, is the person contemplated by the Harter Act as the "owner" who must exercise "due diligence." As noted above, liability of other owners is limited to the amount of their investment or their proportionate share of the ship. Even if the vessel is chartered to another person, the managing owner is not exempt under many conditions. In the matter of bills of lading or contracts of affreightment, the test of responsibility is whether or not the owner has laid the ship on berth. If so, he is responsible. In other contracts or in torts, responsibility lies with the person who victuals, mans, and fuels the vessel, be he owner or charterer.

American law is much more liberal to the owner than the law of other countries. It is much closer to the ancient law in its recognition of the injustice of unlimited liability for happenings beyond the owner's control. This is in direct conflict with the common law doctrine, however, and the courts are influenced greatly by the common law no matter what the statute may be. Common law considers a ship as personal property, not a person; and it has been some thirty generations since under common law the liability of the owner of a vicious dog could not go beyond the value of the dog itself. It is safe to predict that in time the limited liability of all owners will be successfully attacked in the matter of recourse for torts. As it is, an owner cannot contract himself out of his responsibility for seaworthiness at the beginning of a voyage, nor out of liability for bad stowage and improper loading. The common law is straining to take all limit off these liabilities; but the owner still has one saving hope: his insurance money cannot be sequestered. Successful suitors may take his ship and seize all freight moneys due. The insurance, however, is unassailably the owner's.

Generally speaking, a lien is created against a ship whenever she accepts a service or does an injury. Such liens are of course in favor of those who perform the service or suffer the injury; but liens are not uniformly enforcible. There is a settled priority of liens, depending upon their character. Liens created by judgment of

court as recompense for tort of course take precedence over all others. Others take precedence in the following order:

1. Salvage.
2. Seamen's wages.
3. Stevedores' wages if the stevedores were employed by the owner or the master.
4. Preferred mortgages.
5. Pilotage and towage.
6. Supplies and repairs.
7. Advances of money.
8. Insurance premiums (when, as not always, they constitute a lien).
9. Mortgages which are not preferred.

Between liens of the same class, priority follows the old seagoing rule "Obey the last order first." The date governs; and the later the date, the more pressing the priority of the lien.

Maritime liens are limited to movable things engaged in commerce and navigation. They will attach to a ship or to her gear and appurtenances, but not to a ship totally out of commission. A lien may be divested as a maritime lien by slowness of enforcement or "laches" as it is termed, the delay being prolonged until the ship is dismantled or broken up. This does not mean that there is no remedy, for the lienor can still bring suit at law; but he loses his ability to arrest or libel the ship as a method of enforcing prompt payment; and he also loses the speed and simplicity of a process in admiralty.

When a ship is libeled she cannot move, load, nor discharge until bond is posted for the full amount of the claim. This drastic method of arrest is not confined to important claims. It is within the power of a tired gentleman on the water front to swear a pauper's oath, thus avoiding court fees, and plaster a ship with a $50,000 libel keeping her immovable until bond is posted, on the ground that the cook threw over a pail of garbage and spoiled his suit of clothes.

Three forms of loans are peculiarly maritime in their nature, although it is probable that one of them—vessel mortage—will soon pass to common law, relaxing admiralty jurisdiction. Vessel mortgage is simply the conveyance of a ship as security for a loan. Under the growing rule, this is a simple chattel mortgage, like other personal property mortgages. Formerly, it was more like a personal indenture, like apprenticeship under the old law merchant.

A bottomry bond is a mortgage-like contract bearing heavy interest where the ship is the sole security and there is no further recourse if she is wrecked or seized. Respondentia is a similar loan upon cargo, repaid if the cargo arrives at destination, not repaid if it is lost. Naturally, bottomry and respondentia are not loans on prime security, and at times interest as high as 25 per cent is demanded.

IV

One section of admiralty law is made necessary by the fact that the master occupies a peculiar position. The owners of a ship are like the owners of corporate stock; the ship's husband performs the duties of a board of directors, the subordinate officers and seamen are foremen and workmen; but the master has no parallel ashore. He occupies a position as responsible, dignified, and unassailable as any known to the law. Governments themselves rigidly prescribe the qualifications necessary to obtain a master's certificate; and to employ a master with a current and valid ticket is the first requirement of the exercise of "due diligence" on the part of the ship's husband. Under the law, the tightest ship is unseaworthy without a legally, as well as actually, competent master, and normally without a substitute for him in case of illness or injury. It is not merely ambition or slow promotion which prompts the display of unlimited master's license by the first officers of passenger vessels. Due diligence requires a first officer eligible to command.

According to the usual direct maritime custom no formalities are necessary in hiring a master. His contract, even for several years, need not be in writing. He shows his license, he bargains with the owner, and he takes out the ship. From then on, he is the owner for all practical purposes, and to a great extent, he is the law. He is so much more than a mere employee that his salary is a matter of contract only—he has no lien on the ship for it—as has the poorest apprentice. When his ship is tied up his authority is of course largely limited; but at sea, even if the owner be present, it is almost unlimited. As corollary, his responsibilities are virtually unbounded. He cannot limit his liability as the owner can. If a suit against the ship fails, or is considered difficult, suit may be brought against him personally.

As the owner's agent, the master can bind the owner like any other special agent. He cannot, however, bind the owner beyond the value of the ship and the freight due, he cannot make a promissory note in any but his own name, nor bind the owner for cargo not billed or manifested, nor admit a fraudulent claim nor *buy* a cargo.

In the exercise of authority over persons he is limited only by his own opinion of necessity. He cannot delegate this authority over persons, nor can he exercise it unless he considers that circumstances warrant it. He is expected to confine himself to warning and reprimand as long as they are effectual; but if he is careful to inform his officers of his intention and to enter his action in the log, he may discipline even a passenger. He must not flog, and his punishments must not be cruel and unusual. He must punish in moderation and upon good reason. He cannot order another person to punish or arrest except as his executive and in his presence and by his direction. Beyond these limits, he is law incarnate.

His contract for wages is enforcible even if not in writing, and is valid even if for more than one year. He has no lien on the ship; but he may garnish freight due or collected. When the amount of his wages is not expressed in the contract, prevailing usage of time, place, and type of vessel is implied therein.

He cannot alter a charter party nor sign a bill of lading for goods wrongly described or not shipped; nor may he issue a bill of lading which conflicts with the terms of the charter. He is required by law to be a competent stevedore, and is responsible for good and sufficient stowage. No matter who hires the stevedore, the master controls him. During the voyage, the master is bailee of the cargo, and safe custody is his duty as well as carriage and delivery. While he is to complete the voyage if possible, he may under pressure of necessity sell or mortgage cargo as well as ship.

The master's power to create liens is thus very broad indeed.

His log is required to be an accurate history of the voyage, giving explicit detail of all occurrences. In order to be introduced as evidence, the log must be proved like any other document.

To lighten the rigidity of his responsibilities, if there has been damage to ship or cargo not due to negligence of personnel during a voyage, or if the circumstances have been such as to warrant the suspicion of hidden damage, the master upon arrival at destination may go before a notary or consul and "note protest." This consists in swearing to a plain, accurate, and complete account of the circumstances and conditions which have occurred. In executing this protest, the master is joined by all officers and members of the crew who have knowledge of the facts.

As the master occupies a peculiar position before the law, so at the other end of the scale, does the seaman. The master is held to almost limitless responsibility; the seaman's responsibility is almost negligible. Seamen occupy a position very close to that of wards of the state. Their improvidence, inability to protect themselves, ingenuousness, and simplicity are matters of judicial notice, and so the seaman lives and moves in an atmosphere of benevolent protection. It is held to be an honorable profession and a necessary one; but the law seems to consider that no man capable of good judgment would enter it. As Dr. Johnson said, "I can conceive of no man's going to sea if he has wit enough to get himself put in jail!"

The form of contract by which a seaman's wages are determined, known as "Shipping Articles," is a carefully standardized form, almost invariably in writing, and very explicit. The seaman casually agrees to have enough knowledge and experience to hold his rating—though you cannot discharge him until you have brought him back home if he hasn't—and to work when ordered to do so. His wages are secured by a prior lien on the ship and freight, and this lien "attaches to the last plank." The ship may be destroyed and the seaman still has a lien on the wreckage. Master and ship's husband are personally liable to the seaman. His wages cannot be attached or garnisheed, and he may sue without giving security for costs. If his wages are overdue he collects double for each day of arrears.

The master may not employ a seaman in any but a legal voyage even with the seaman's consent. The seaworthiness of the ship, her equipment and provisioning are guaranteed the seaman even more stringently than the charterer. His treatment

must be decent and humane, his food plentiful, good, and of considerable specified variety. The voyage for which he ships must be definitely stated and completed without deviation. He is to receive care and treatment if ill, and must be sent home when the voyage is over.

The courts are open to the seaman in many ways for the redress of grievances. This is logical enough—at sea the master is supreme and the seaman cannot refuse duty nor strike back. If the law did not give him extraordinary facilities for redress at the end of the voyage there would be little or no restriction on brutal masters and bucko mates. United States law was once deficient in these remedies and American ships got a bad name as hell-packets the world over. We are now, in reaction, a bit too far perhaps in the other direction, even to the extent of undermining the master's necessary authority at times.

V

The world has seen code after code of law rise, grow, become top-heavy with statute and delay until modified beyond all recognition. While the three great codes that rule the dry land retain their ancient names and tradition, they are daily being amended, ruled, decided, and legislated into new forms. The wonder then is that the law maritime sways through the centuries practically unchanged, and but slightly modified to local conditions. A few pages back was noted the impending change of a ship's status before the law, from that of a person to that of a chattel, at which change the courts, following the common law, are aiming. It is here worthy of remark that this is the only change which has been seriously contemplated in *nearly four thousand years!* Admiralty law has a secret of perpetual youth which the landward codes lack.

Ships to live must move. To keep moving, their disputes must be settled quickly, and the constant concern of the law maritime is to provide a quick and efficient remedy. There is no essential difference in the law itself, but it provides for a vastly accelerated method of application, as may be noted from the forms of proceedings.

Proceedings in admiralty the world over are of two kinds today. In the United States, which is still closest to the old Phoenician model, we have also a third kind, which may be mentioned first, "proceedings *in rem*." This is directed against the ship as a person to enforce rights in maritime liens. The ship herself is seized, is impleaded as defendant and acquitted or sentenced in her own name. Sales under proceedings *in rem* divest all liens. This is the peculiarly maritime feature of such procedure, as under common law, only defendant's title can be affected by a judgment. In general, every maritime lien carries with it the right to bring proceedings *in rem* to enforce it. This is done by first libeling the vessel and then securing a writ *in rem*.

Where personal liability exists such as that of master or ship's husband, and the subject matter is maritime, suit in admiralty may be brought against persons, these suits being called proceedings *in personam*. Personal liability attaches to the person who signed the contract which has been breached, or committed or instigated the tort out of which the complaint grows. The process here is a simple writ or summons such as is used anywhere.

As noted, owners may take refuge from excessive liability by handing over the ship herself. This is of course limiting their responsibility to the ship's value. In order to avail themselves of this limitation, proceedings under the limited liability act are necessary. A petition is filed and the ship turned over to a trustee or bond given for her value. All suits are then stayed, and all creditors must present their claims at the hearing. Proceedings under limited liability are thus a sort of maritime bankruptcy. They are the only sort of proceedings under the law maritime which require much more red tape than is necessary to subpoena an ordinary police-court witness.

That is why the law maritime stays young.

Some Aspects *of* Carrier *and* Cruiser Design

By Lieutenant Commander Forrest Sherman, *U. S. Navy*

The classes of ships which constitute a fleet are, or ought to be, the expression in material of the strategical and tactical ideas that prevail at any given time.—Corbett

IN THE early days of the gun as the principal armament of naval forces, the conception of using units of ships of particular sizes and characteristics for particular missions either did not exist or had little influence on the course of events. When fleets consisted of hastily collected and armed merchant vessels there was naturally no choice other than to take the ships available, their size often depending on little else than the conditions under which they were used for private gain, including the important factor of the relative wealth of the owner. In the days of the Spanish Armada, of the naval wars between the Dutch and the English, fleets were collections of vessels of all sizes and rates, all of which took part in the promiscuous fighting of the fleet actions of the day. But as the development of rudimentary tactics led to the establishment of the line of battle as the basic fighting formation of fleets, a differentiation was made between "ships fit to lie in the line" and those not so fit.

The classification of ships of war into "rates" was a more or less unscientific arrangement for many years, the "rate" depending on size and not on any strategical or tactical function. Under Anson's administration of the British Navy, however, appeared a clear-cut rating of ships according to their intended function and construction commenced to follow the demands of intended function. Colomb in his treatise on naval warfare demonstrated the tendency of naval force of the pre-torpedo era to differentiate itself into three classes: (1) the line-of-battle ship, (2) the frigate or heavy cruiser for fleet service, and (3) the light cruiser for attack and defense of commerce, greatly inferior to the frigate class but much more numerous.

As the increased power of minor attack, due to the perfection of the torpedo, commenced to influence naval construction, types became more numerous. There were introduced the surface and subsurface torpedo vessel and other types designed to combat them; consequently the threefold classification became less distinct. However, there continued to be built heavy gun-carrying vessels to form the line of battle—battleships and battle cruisers. There continued to be built fleet cruisers to perform the lookout and scouting functions of the old frigates. The light cruiser class for use on the trade routes tended to become confused with the heavy cruiser class in a period in which navies were experimenting with armored cruisers, protected cruisers, first and second class cruisers, and scouts, but during the World War the same demand for numbers, even at the expense of the power and effectiveness of individual units, led to the rush to construct light cruisers, sloops, destroyers, and to the use of old cruisers and converted merchantmen, even ancient gunboats, to protect the trade routes and military lines of communciation by sea against raiding vessels of various types.

The ultimate aim of sea warfare is the control of sea communications in order to exert pressure on the enemy nation by cutting off its trade, and preventing its military use of sea communications. Success in this aim also insures the free use of the sea for our commerce and for our operations of war. Before these things can be certain of accomplishment it is necessary to destroy, disable, or blockade the enemy naval force. On the degree of success in this effort will depend the degree of control of sea communications which can be exercised. Command of the sea can be secured only by the defeat of naval forces which dispute it. Yet, at the commencement of

hostilities between two maritime powers, naval force cannot be entirely concentrated for use in gaining command of the sea by battle. Each power has its own sea-borne trade to safeguard and is forced to detach forces for that purpose. Due to geographic and commercial considerations, ocean traffic tends to become congested at certain focal points of trade routes and in certain terminal areas. Adequate disposition of naval forces for the protection of shipping in these congested areas automatically ensures adequate disposition for the attack on enemy vessels in the same areas. Therefore, unless one power withdraws its ocean shipping into the shelter of its own and neutral ports and accepts the handicap of this tremendous economic sacrifice, the commencement of a naval war finds certain naval forces distributed over wide areas in comparatively small units engaged in what are termed "cruiser operations" on the trade routes. These operations continue until one contestant gains a definite supremacy at sea.

The period since 1914 has seen the widespread introduction into naval forces of a new weapon—the airplane. This weapon, because of its new and comparatively untried status at sea, has been taken to sea in ships in a manner just as haphazard as was the gun in the days of the Armada. Airplane handling facilities of various sorts have been superimposed on the equipment of existing combatant types. Even aircraft carriers have been chosen for considerations other than their fitness for that use. We have two battle cruiser hulls and one collier hull which were made available to carry the new weapon. Great Britain has one battleship hull, three cruiser hulls, one merchant vessel, and one specially designed carrier, the *Hermes.* Japan has three converted hulls carrying aircraft and France, one. It is logical to assume that there will eventually develop the same tendency, the working out of the same principles, which caused scientific differentiation of types of gun vessels. It seems obvious that a vessel designed to operate in defense of trade routes will differ materially from a vessel designed to take part in a fleet action whether its armament be airplanes, guns, or both.

Carrier operations as at present visualized may be grouped under three major categories: (1) The air offensive against the enemy main body, (2) scouting and screening, (3) air support and assistance to the surface offensive.

The air offensive using heavy bombs and torpedoes will always require the largest carriers because of the larger airplanes involved. Since such operations are carried on by a force acting with a high degree of freedom from rigid formation with the main body it must as a unit have a high degree of surface strength and a fairly high speed. If the carriers themselves lack gun power it must be supplied by attaching cruisers in support. The *Saratoga* and *Lexington* with their high sustained speed, heavy batteries, and enormous airplane capacity are well suited to this employment. They are too valuable to use to furnish air scouts for a detached cruiser line. Their high strategic mobility has been well demonstrated by the *Lexington's* day's run of 770 nautical miles and by the *Saratoga's* spectacular simulated attack on Panama after a passage from San Diego via a point south of the equator. Vessels of their type and approaching their type, for they are of extreme size, will form the nucleus of a highly mobile naval air striking force, which, with the addition of the necessary attendant light forces, will form a major unit of the fleet of the future.

The modern line of battle includes ships with batteries of the longest ranges practicable incident to the increase of elevations in new and reconditioned ships. Air support is essential to the proper functioning of these batteries; they must be furnished spotting planes which must in turn be protected by the action of fighting planes. Enemy spotters must be attacked, local tactical information must be furnished to the surface ships, and enemy attack flights must be intercepted. All these local tasks call for a considerable number of air units under the direct control of the battle-line command. Those air units not actually carried in capital ship units must be carried by a vessel or vessels in the immediate vicinity of the battle line. These requirements can best be met by the provision of battle-line carriers whose characteristics are determined by their intended employment.

For such carriers fairly high airplane capacity is a desideratum. Speed may be moderate subject to the requirement of sufficient speed to maneuver without losing

distance on the force to which attached. As at present visualized this means a carrier of about ten thousand tons, about 28 knots top speed, and cruising radius sufficiently in excess of that of the battle line to permit of the extra steaming incident to the demands of carrier service. The characteristics of a battle-line carrier and of its airplane complement will render it entirely suitable for use in escorting large convoys and major oversea expeditions. Battle-line carriers, with their equipment of observation and fighting squadrons will be well adapted to the support of landing force operations. Merchant vessels can readily be converted into this type of carrier.

The service of information and security with a fleet at sea involves the use of cruisers and aircraft in close coöperation; and the aircraft, if their recovery is to be positive and assured in heavy weather, must come from the decks of a carrier. Certainly the heavy carrier of the striking force laden with the main air attack strength of the fleet should not be exposed with an advanced scouting line. Its loss in an early surprise contact would be too serious a blow.

The battle-line carrier in which high sustained speed has been sacrificed to capacity is too slow for work in coöperation with cruisers unless the high sustained speed of the cruisers is to be wasted. There is a definite need for a light fast carrier able to make speed to the front equal to the speed of advance of a scouting line, which incidentally means speed around the 35-knot figure, and of small enough size and value so that the cruisers may be free to perform their mission with relation to information rather than to be forced to consider the safety of their attached carrier. These requirements point to a carrier of small proportionate airplane capacity as well as of small size.

Lieutenant Commander B. G. Leighton, U. S. Navy, since resigned, in addressing the Naval War College in 1928 on the subject of carriers of the 10,000-ton class said:

> It is admittedly no match for a gun cruiser once the two are placed within gun range. But due to its great superiority in range of vision; due to its great superiority in effective striking range; due to its decided superiority in offensive value in direct attack against capital ships, which grows out of its superior striking range; due to its superiority in repelling enemy air attacks, either by direct attack against enemy carriers or by the use of its fighting planes in direct offensive against airplanes in flight; due to its superior ability to shift its striking power rapidly from point to point over a wide area in battle, without the necessity for changing the position of the ship in relation to other units; due to its superior qualities in striking shore objectives from beyond gun range of shore batteries; due to its superior ability in covering landings of troops and maintaining communications between ship and shore; it appears that the advantages distinctly outweigh the disadvantages.

The time for weighing the 8-inch gun cruiser against the 10,000-ton carrier as to its merits for future construction is ended. Our 8-inch cruiser tonnage and carrier tonnage have been definitely settled by two treaties and we require all that we are allowed in both categories.

As has been previously stated the rôle of cruisers in naval warfare is one not only of participation in major fleet operations and in the fleet battle itself but also one of the direct protection of trade, and of the direct control of sea communications. It is timely and valuable to briefly examine the cruiser operations of past wars and to attempt to evaluate the effectiveness of carrier type cruisers in similar operations, since upon their effectiveness in such operations must depend, to a large extent, their value as a cruiser type and the advisability of taking advantage of the provisions of the London treaty which permit their construction. Experience certainly should have taught us that operations to control sea communications form a major part of our naval activities. The operations of the American Navy in the Revolutionary War and War of 1812 were almost exclusively direct attacks on commerce. The outstanding naval achievement of the Civil War was the establishment and maintenance of the blockade, while in the World War we directed our principal effort to the protection of shipping against submarines and raiders. Certainly with an ocean-borne commerce worth over fifteen billions of dollars a year, while to quote Mr. Hoover, "Our total volume of exports translates itself into employment for 2,400,000 families," it will in case of hostilities become necessary for us to make a major effort to insure a minimum disturbance of our economic life. Conversely economic pressure on an enemy should commence as soon as practicable on the out-

set of hostilities. This means cruiser warfare from the start.

There is a well-developed trend of thought in the world today along lines typified by Mr. J. H. Rose's essay on *The Indecisiveness of Modern Naval War* to the effect that:

> Great battle fleets, like those which did not close at Jutland, are not likely to achieve a decisive result, and that naval warfare will probably resolve itself into a prolonged blockade, exerted in reality against the enemy's civil population.

Certainly our conceptions of two opposing fleets watching each other at short range and finally coming to close action have, by the combination of the existing treaty strength ratios and the distances involved in both Atlantic and Pacific, become unlikely of fulfillment until increased construction, conversion of merchant vessels, attrition by minor attack, or some unforeseen factor, enable one fleet to gather sufficient preponderance of strength to permit it to project itself into enemy waters. Meanwhile cruiser operations would probably be of great importance.

In the wars of the eighteenth and early nineteenth centuries the British system of trade defense was to hold in strength the terminal areas and important focal areas where trade routes converge and to leave the intervening trade routes undefended except for the escorts assigned individual convoys. The regions in the approaches to defended areas were more liable to attack, so the movement of important convoys was covered by additional danger zone escorts. Where possible the ocean escort of an important convoy included a line-of-battle ship, particularly if attack by a heavy enemy vessel threatened.

In a discussion of our operations in the year 1812 Mahan says:

> Historically, as a military operation, for the injury of an enemy's commerce and the protection of one's own, it may be considered fairly demonstrated that vessels grouped do more effective work than the same number scattered.

He repeatedly points out the effectiveness as a measure of protection to our shipping of the offensive cruise of Commodore John Rodgers' squadron. Within an hour after receiving the Declaration of War in 1812 Rodgers sailed with a squadron of five ships including the two heavy frigates *President* and *United States*. As it turned out one objective, the Jamaica—England convoy, was missed and few prizes were taken, but extensive defensive measures were forced on the enemy and in Rodgers' own words which Mahan considers justified:

> Our being at sea obliged the enemy to concentrate a considerable portion of his most active force, and thereby prevented his capturing an incalculable amount of American property that would otherwise have fallen a sacrifice.

For example Rodgers' threat forced Captain Broke of H.M.S. *Shannon* to escort a convoy a thousand miles to sea with his entire squadron of one ship of the line and four frigates.

In the World War the Grand Fleet blockaded and neutralized the High Seas Fleet just as the old Western Squadron had blockaded the French fleet in Brest in the old days. Defensive flotillas were again stationed in the focal areas such as the Channel and its approaches, the Straits of Gibraltar, and in the Malta area. These defense flotillas consisted of destroyers, torpedo boats, sloops, and aircraft as against the frigates and sloops of the Napoleonic era, but their strategic function remained unchanged. The ocean escorts were still old line-of-battle ships or cruisers while short radius coastal forces protected coastwise and local traffic. The demand for vessels for cruiser work led to the employment of all available allied units. Even old gunboats, yachts, coast guard cutters, and armed trawlers were called on for escorting convoys, so pressing was the need.

In August 1914, of Great Britain's 486,700 tons of large cruisers (above 10,000 tons) only 52,800 tons were with the fleet; of her 309,940 tons of smaller cruisers 153,400 tons were with the fleet. The patrol of the trade routes and focal areas employed eleven cruiser squadrons totaling some forty-two ships. To the control of the trade route to Germany north of England were assigned the six *Edgar* class cruisers of the Tenth Cruiser Squadron. In the Channel approaches were four light cruisers and nine French cruisers of the Western Patrol. To the west of Ireland operated the Eleventh Cruiser Squadron. To the Finisterre station went six cruisers of the Ninth Squadron while the Cape Verdes-Canaries area was to be covered by the Fifth Cruiser Squadron—four ships. In the west Atlantic were Admiral Cradock's Fourth

Squadron of five cruisers. The Mediterranean was strongly held by a force of four battle cruisers, four heavy cruisers, and four light cruisers. On the Cape station were three rather old cruisers; in the East Indies an old battleship and two cruisers; and in China a battleship, two cruisers, two light cruisers, and a flotilla of light craft, to which could be added the Australian squadron of a battle cruiser and three effective light cruisers. Thus the focal areas were held as strongly as practicable.

The assignment of units to stations was soon altered by the developments of the cruiser operations incident to clearing the outer seas of enemy cruisers and raiders and by the demands of the fleet. As rapidly as possible cruiser forces were augmented, and in some cases relieved, by armed merchant cruisers. In addition, in order to stiffen the outlying commerce protection squadrons and furnish them with a strong support against enemy attack, older battleships were attached—the *Glory* to the Halifax area, *Canopus* to the Cape Verdes station, *Albion* to the Finisterre command, and *Ocean* to the Western Patrol. Corbett says:

> For the Grand Fleet to guarantee that battle cruisers could not break out was impossible, and as in the old days it was the practice to strengthen such squadrons with a lesser ship of the line, so now it was thought well to detach some of the oldest battleships to furnish them with a rallying point.

An outstanding feature of the distribution of forces outlined, so far as types are concerned, is the invariable demand for cruisers sufficient in number to form efficient search units and to furnish reliefs on patrol stations. Another is the provision of stiffening or supporting vessels capable of meeting a strong enemy. Corbett, in discussing the old practice of assigning fifty-gun ships as the flagships of cruiser commodores, states:

> It is not unreasonable to expect that the strategic value of the supporting intermediate ship will be found greater than it ever was in sailing days, and that for dealing with sporadic disturbance the tendency will be for a cruiser line to approximate more and more in power of resistance to that of its strongest unit.

Since the foregoing statement was made the airplane has made its appearance in sea warfare and changed conditions so as to make it truer than before.

Under current naval policy as given concrete form by the provisions of the Washington and London treaties, the United States Fleet has and can have available for supporting cruiser operations no old battleships and no intermediate ships. Capital ships are few in number and will continue to be so unless a marked change in existing views causes replacement by smaller and less expensive vessels. Many of our heavy cruisers of the Washington-treaty type must be held with the fleet to offset the absence of battle cruisers. In fact as our battleships grow older there is a strong possibility that the method of disarmament by attrition and failure to replace expensive units which took place after 1814 and 1865 may serve to continue the reduction of battleship numbers and total tonnage. Public opinion in most countries seems at present, rightly or wrongly, averse to battleship replacement. This tendency may cause 8-inch gun vessels to become an increasingly vital portion of our battle fleet strength and thus limit their dispersion to outlying units.

It behooves us, therefore, to seriously consider the possibility of utilizing vessels of the "London treaty class," 6-inch gunned cruisers with flying decks, for the cruiser operations necessary to us, supplementing them with attendant lighter vessels as required.

The extensive operation of airplanes from a carrier requires the presence of attendant light vessels to a greater degree than would at first thought appear necessary. Carrier scouting planes and light squadrons from carriers can and have operated at long distances from their carriers, but their ability to arrive at the right place at the right time, to furnish useful information with the highest accuracy, and finally their ability to return directly to their carrier after a long flight are dependent to a great extent on the presence of linking and reference vessels. It is true that, as aërial navigational equipment including directional radio apparatus is improved, reference vessels will become less essential, but under the stress of war conditions it is believed that their presence will continue to be necessary. Even a small carrier can readily send powerful attack flights capable of destroying cruisers and of giving pause to a battleship. The attached units may, therefore, be of the smallest size.

It should be sound to contemplate the em-

ployment for control operations, and for scouting and screening, of units composed of a carrier or carrier cruiser and attendant light vessels such as small cruisers with an armament of not over 6-inch guns and with speed enough to enable them to delay action in high visibility while awaiting aircraft support. In low visibility when surprise contact is possible the 6-inch gun cruisers can be depended on to give a good account of themselves unaided. The carrier cruiser is capable of performing all the functions of the supporting or stiffening ship with cruiser squadrons by means of its light bombing squadrons. A carrier cruiser in the place of the old battleship *Canopus* would have changed the story of Coronel. A carrier cruiser in the forces trailing the *Goeben* and *Breslau* in 1914 might have had a far-reaching effect on the course of the World War. One with von Spee at the Falklands would have prevented him from walking into the trap awaiting him. Furthermore, the cruiser with airplane armament is the only answer to the merchant cruiser armed with airplanes—always a possibility.

The gun armament of a carrier cruiser is adequate for the general duties of control of trade routes insofar as they require superiority of force over merchantmen. Its airplane equipment will enable it to greatly increase the radius of its effectiveness in search or patrol, and if need be, enable it to overcome an ordinary cruiser without coming under fire. As a convoy escort vessel it will be effective not only against surface types, but also, by means of its airplanes, against subsurface attack. Its airplanes will be highly effective as antisubmarine patrols, either in place of or in addition to surface antisubmarine craft. In brief, a 10,000-ton cruiser armed with a respectable battery of 6-inch guns and two or more squadrons of airplanes of the light bombing type can under most conditions better perform the duties of "cruiser operations" than can an 8-inch gun cruiser or than can an equivalent tonnage of small 6-inch gun cruisers. Moreover, the use of carrier type cruisers and small carriers enables the advantageous use of a greater number of small cruisers.

The great weakness of carriers lies in the restrictions imposed upon air operations under unfavorable conditions of weather and the danger of surprise contact in low visibility. The weakness of the small cruiser lies in the danger of a long-range action in high visibility against a cruiser of superior gun power. It is evident that these two conditions do not arise at once and that a mixed armament of airplanes and 6-inch guns may prove to be very successful.

Our cruiser needs for detached operations and for fleet purposes are such that large numbers are essential; the use of carrier cruisers as supports will enable the use of smaller units for duties otherwise demanding powerful vessels; and, within the limits imposed by the treaties, our naval efficiency will be improved by the devotion of a maximum of cruiser tonnage to vessels carrying flight decks and effective offensive airplanes.

From the foregoing it will be seen that from our 135,000 carrier tons and 73,000 carrier-cruiser tons we need airplane-carrying vessels of four types for four distinct classes of operations:

(1) Air force carriers, large and powerful and of high speed.
(2) Battle-line carriers, of intermediate size and moderate speed.
(3) Scouting carriers, small but of very high speed.
(4) Carrier cruisers, carrying light bombing planes and a fair 6-inch battery.

The aircraft carrier has become an accepted type in the navies of the leading naval powers and in preparing for the eventualities of a war at sea we must bear in mind the unvarying rule that, in the development of weapons and tactics, each war begins where the last one left off. No one can say just what the composition of the fleet of the future will be but it seems certain that its carriers will tend to follow the same principles of differentiation of force and type according to the strategical and tactical uses to which put as have vessels armed with guns. There is no doubt whatsoever that the United States Fleet should include every flight deck permitted by the treaties, even if they are not used to capacity until mobilization produces the full complement of pilots and planes.

Panama Tides

By H. A. MARMER, *U. S. Coast and Geodetic Survey*

AS THE crow flies, the Atlantic and Pacific entrances of the Panama Canal are but little more than thirty nautical miles apart. It would therefore not be unreasonable to conclude that the tides at the two entrances are much alike. For is not the tide brought about by astronomical forces, by the so-called tide-producing forces of sun and moon? And are we not accustomed to seeing the tide pictured as a wave moving westward across the seas under the influence of the moon?

As a matter of fact, however, observations prove that the tides at the two ends of the Panama Canal differ in almost every respect. As regards time, for example, high water and low water at the Atlantic entrance are almost exactly three hours earlier than at the Pacific entrance, although the latter is the more easterly. And as regards range, the tide at the Atlantic end rises and falls a little less than a foot on the average, while at the Pacific end the rise and fall averages 12.5 feet.

But what is even more striking is that the very character of the rise and fall of the tide at the two places is different. At the Pacific entrance there are two high and two low waters each day; but at the Atlantic entrance there are frequently several days at a stretch when but one high water and one low water occur each day. This difference in the character of the rise and fall is clearly brought out in a comparison of tide curves at the two places for several days.

In Fig. 1 are shown the curves representing the rise and fall of the tide at Balboa, on the Pacific side of the canal, for the tenth, fourteenth, and eighteenth of January, 1927. The horizontal line associated with each of the curves represents sea level. At a glance it is seen that the rise and fall of the tide here is of a regular character, two high and two low waters occurring each day with morning and afternoon tides resembling each other in all respects. And, except for the difference in the times of high and low water, the tide curve of one day resembles that of another.

At Cristobal, on the Atlantic side of the canal, the condition of tidal affairs is quite different, as an examination of Fig. 2 reveals. In this figure are shown the curves of rise and fall at Cristobal for the same days as in Fig. 1. Here the tide is clearly not of as simple a character as on the Pacific side. Morning and afternoon tides are here generally dissimilar; the tide curve for one day is not the same as that for either of the other days; and on the eighteenth there is but one high and one low water, instead of two as on the other days. In fact, the only apparent similarity between the two sets of tide curves is the progression in the times of high and low water. At both places the tides on the eighteenth are approximately seven hours later than on the tenth.

The rise and fall of the tide as represented by the tide curves of Fig. 1 is typical for Balboa. During any month, to be sure, the rise and fall is greater than the average at the times of new and full moon, and less than the average at the times of the moon's first and third quarters. But the character of the rise and fall remains the same, with morning and afternoon tides resembling each other in all respects.

In the same way the tide curves of Fig. 2 are representative of the rise and fall of the tide at Cristobal. Within a week there are generally two days each with two high and two low waters, with relatively little difference between morning and afternoon tides. This is followed by two or three days in which morning and afternoon tides differ considerably; these in turn being followed by two days in which but one high and one low water occur.

The change in the character of the tide from day to day at Cristobal is found to be

related to the varying positions of the moon relative to earth and sun. But before considering this matter further it will be of advantage to digress for a moment to a consideration of the tide in general. That moon and tide were in some way intimately connected, must have been discovered early in the life of mankind; for, not only does the tide vary in the amount of its rise and fall with the moon's changing phases, but like the moon it also comes later every day by about fifty minutes. That the sun, too, is concerned in the rise and fall of the tide is evident from the fact that at times of full and new moon, when sun, moon, and earth are approximately in line with one another, the tides have their greatest rise and fall; while when the moon is in her first and third quarters, that is, when sun, moon, and earth are at the vertices of a triangle, the rise and fall of the tide is at a minimum.

Before the beginning of the Christian Era, the Greeks and Romans had recognized the fact that the tide was brought about by sun and moon, and they recognized, too, that the moon played the leading rôle. But the agency by means of which sun and moon produced the tide remained a mystery for many centuries. Indeed, it was not until the genius of Newton in the latter decades of the seventeenth century discovered and formulated the law of gravitation that the connection between moon and tide received a rational explanation. Newton proved that the tides were a necessary consequence of the law of gravitation. The sun and moon in their varying positions relative to the earth bring about attractive forces which, with regard to the solid earth and the overlying waters of the sea, are unequal. And it is these differences of attraction which give rise to the tides.

At first thought it is something of a paradox that in the tidal movement of the sea, the sun must yield supremacy to the moon which is so much smaller a body. But when on the basis of gravitation the tide-producing power of a heavenly body is developed mathematically, it is found to vary directly as its mass and inversely as the cube of its distance from the earth. In round numbers the sun has a mass 26,000,000 times that of the moon, but it is 389 times farther away. Hence the tide-producing power of the sun is to that of the moon as 26,000,000 is to $(389)^3$ or somewhat less than half.

The moon moves around the earth in an orbit inclined to the equator; which means that part of the month the moon is north of the equator and part of the month south. The earth likewise moves around the sun in an orbit inclined to the equator, so that part

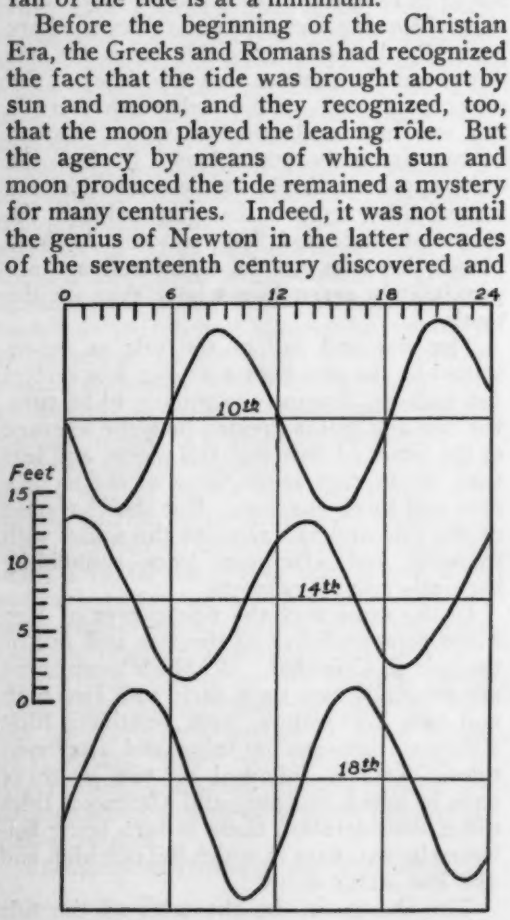


FIG. 1. TIDE CURVES, BALBOA, JANUARY, 1927

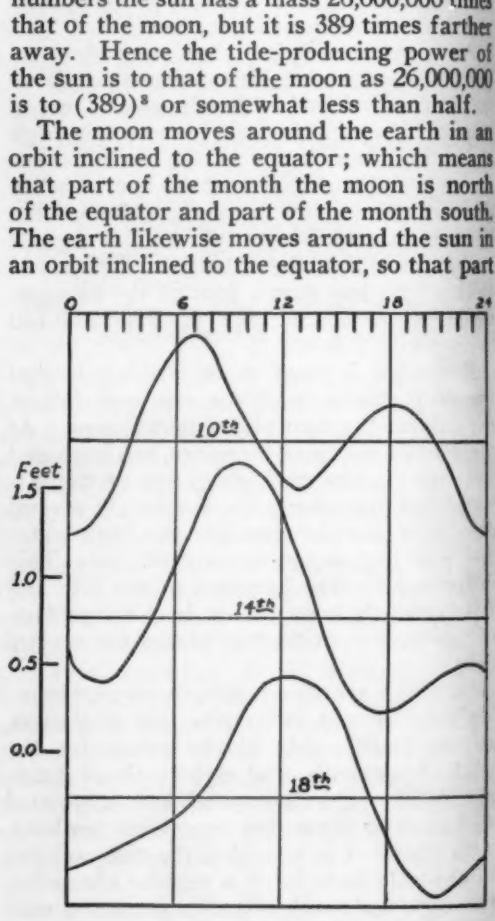


FIG. 2. TIDE CURVES, CRISTOBAL, JANUARY, 1927

of the year the sun is south of the equator and part of the year north. These relative movements of earth, moon, and sun, together with the daily rotation of the earth, give rise to two primary classes of tide-producing forces: (1) those having a period of about half a day, which are therefore called semi-daily forces; (2) those having a period of a day, known as daily forces. Of these two classes the semi-daily tide-producing forces are the larger. They go through two complete cycles in a day and it is because of the predominance of these semi-daily forces that there are at most places two complete tidal cycles, and therefore two high and two low waters in a day.

It is important to note in this connection that the tide-producing forces are astronomic in origin, and hence are distributed over the earth in a regular manner, varying only with latitude. But the response of any ocean or sea to these astronomic tide-producing forces depends on its depth and configuration. As a result the tides as they actually occur differ markedly not only in time and in range but also in the character of the rise and fall.

With regard to character of rise and fall, tides are most conveniently divided into three types, known respectively as the semi-daily, daily, and mixed types of tide. The semi-daily type is illustrated by the tide curves of Fig. 1, the distinctive feature of this type being two high and two low waters in a day with but little difference between morning and afternoon tides. The daily type is illustrated by the lower curve of Fig. 2, the distinctive characteristic of this type being the occurrence of but one high and one low water in a day. The mixed type of tide is illustrated by the middle curve of Fig. 2, the distinctive feature being two high and two low waters in a day with considerable difference between morning and afternoon tides.

Now it can be easily shown that the mixed type of tide arises from the combination of a daily and a semi-daily tide. Suppose that at a given place the semi-daily and the daily tide-producing forces each give rise to a simple tide of their own kind with a range of two feet as shown in Fig. 3. In this diagram the dotted curve represents the semi-daily tide and the dashed line the daily tide. What will the resultant tide be like? Clearly, to derive the resultant tide all that need be done is to add the heights of the two constituent tides at various times throughout the day and draw a smooth curve through the points so determined. In Fig. 3 the full-line curve is the resultant tide curve, and proves to be of the mixed type of tide.

Parenthetically it should be noted that various forms of the mixed type of tide are found to occur. At Cristobal, for example, the difference between morning and afternoon tides is largely in the high waters. At Seattle, Washington, however, this difference is almost wholly in the low waters, morning and afternoon low waters frequently differing by as much as eight feet. A third form, in which morning and afternoon tides differ in both the high and low waters, is exemplified at San Diego, California.

All the different forms of the mixed type of tide, however, can be shown to result from different combinations of daily and semi-daily tides. In the example shown in Fig. 3, the two constituent tides were taken to have the same range and such time relations that their high waters coincided. By giving the daily and semi-daily constituent tides different ranges and different time relations, all the various forms of the mixed type of tide can be derived.

Mathematically it is not difficult to prove the following general results with regard to the combination of daily and semi-daily constituent tides. When the range of the daily constituent is less than twice that of the semi-daily, two high and two low waters will occur in a day, the difference between morning and afternoon tides increasing with the relative increase in range of the daily constituent. When the range of the daily constituent is between two and four times as great as the semi-daily, either two high or two low waters, or only one high and one low water will occur in a day, depending on the difference in phase between the two constituents. When the range of the daily constituent is more than four times that of the semi-daily, only one high and one low water will occur in a day.

It appears, therefore, that in the rise and fall of the tide at Balboa there is very little daily tide, for as Fig. 1 shows, morning and afternoon tides differ in scarcely any respect. At Cristobal, on the other hand, the daily tide appears to be relatively large, for not

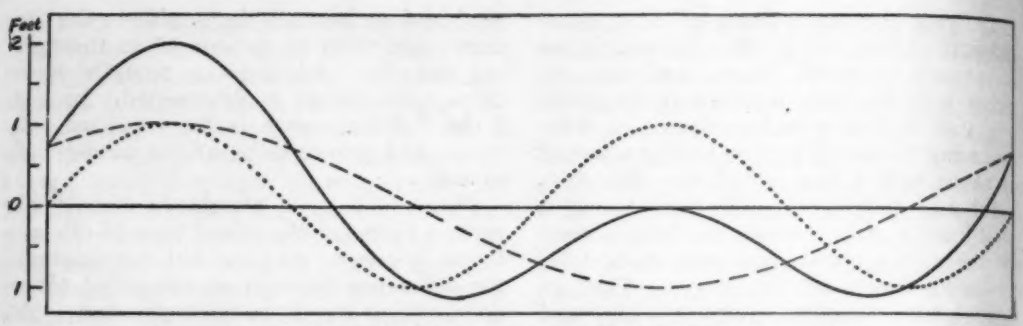


FIG. 3. COMBINATION OF A DAILY AND A SEMI-DAILY TIDE

only is the tide here of the mixed type but during each fortnight there are several days when but one high and one low water occur.

Now the daily tide-producing forces arise principally from the fact that the moon's movement around the earth takes place in an orbit that is not within the plane of the equator, but is inclined to that plane. This means that the moon's declination goes through periodic fortnightly cycles of increasing and decreasing declination. Within a fortnight, therefore, the daily tide-producing forces go through similar cycles of increasing and decreasing magnitude. When the moon is on or close to the equator, the daily tide-producing forces have their least strength; while when the moon is at her maximum declination they have their greatest strength.

These periodic fortnightly changes in the daily tide-producing forces find reflection in the tides at Cristobal. On January 10, 1927, the moon was over the equator; and as the upper curve of Fig. 2 shows, there was relatively little difference between morning and afternoon tides. By the fourteenth of the month the moon had acquired considerable declination, which was reflected in very considerable difference between morning and afternoon tides. On the eighteenth the moon had but recently reached her maximum northerly declination for the month, and as a result but one high and one low water occurred that day.

Disregarding for the moment the very considerable difference in the range of the tide at the two ends of the Panama Canal, the difference in the characteristics of the rise and fall appears to reside in the fact that at Balboa there is very little daily tide, while at Cristobal there is relatively a great deal. In trying to understand why this should be so, we must invoke the aid of tidal theories that attempt to explain just how the waters of the oceans and seas respond to the tide-producing forces of sun and moon.

In explaining the varied manifestations of the tide in the seven seas, two theories hold the field. The older is known as the progressive-wave theory, and considers the tides of the world as due primarily to the action of the tide-producing forces of sun and moon on the broad and deep waters of the southern ocean, the belt of water that completely encircles the earth in high southern latitudes. Here the tide-producing forces were assumed to have uninterrupted sway, so that two primary tidal waves 180° apart in longitude were formed. As these primary waves swept past the southern points of Australia, Africa, and South America they generated secondary waves which progressed up the Indian, Atlantic, and Pacific oceans respectively.

According to the progressive-wave theory, careful distinction must be made between the primary tidal waves traveling from east to west in the southern ocean, and the secondary waves which progress up the other oceans and seas. The secondary waves travel as free waves, their velocity depending on the depth of the water. But the primary tidal waves in the southern ocean keep step with the moon; they travel not as "free" waves but as "forced" waves, compelled by the moon to keep in time with its own movement.

The differences in the time, range, and other features that are found to characterize the tides at different places, the progressive-wave theory explains as being due to differences in depth and width of channel, to variations in the configuration of the shore

line and to interferences of tide waves coming from different directions. And because the progressive-wave theory accounted for numerous features of the tide in an apparently satisfactory manner, it was accepted by the leading tidal authorities until the beginning of the present century.

With more detailed knowledge of the tides in the various seas, however, it became clear that the progressive-wave theory left too much to be explained by changes in cross section of channel, configuration of coast line, and interference of tide waves coming from different directions. Various investigators found that many features of the tide could be more easily explained by stationary waves than by progressive waves. And it is on stationary waves that the more recent theory of the tide is based, this theory being known as the stationary-wave theory.

It is a familiar fact that a body of water disturbed from its condition of rest tends to set up waves. This is illustrated in a variety of ways—by the wind sweeping over the surface of a lake, by the boat plowing through the water. And in the same way the tide-producing forces of sun and moon as they sweep across the waters of the sea bring about the mighty wave which manifests itself as the tide.

A body of water disturbed from its condition of rest is capable, however, of sustaining either of two different types of wave movement. In a rectangular tank of water, for example, a wave may be started by agitating the water at one end with a paddle. This wave will progress from one end of the tank to the other, the outline of the wave being the sinuous curve which we generally associate with wave movement. This wave is technically a progressive wave.

But in that same tank of water a wave movement of an entirely different kind may be set up, by raising and then immediately lowering one end of the tank. This wave movement will not, however, be in the form of the ordinary wave with crest and trough progressing from one end to the other. Instead, it will consist of an oscillation or swashing about an axis lying in the middle of the tank, as illustrated in Fig. 4. When motion toward the left has ceased, the surface of the water will be in the position represented by the line *AB*. The water will then begin its oscillation in the opposite direction, at the end of which the surface assumes the position represented by the line *DE*. The line through the middle of the tank, one point of which is represented by *C*, is the nodal line. This type of wave is known as a stationary wave.

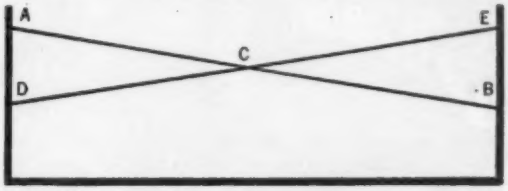


FIG. 4. STATIONARY WAVE

Without going into too great detail in regard to the stationary wave, it will be noted that the range of the vertical oscillation increases regularly from the nodal line to the end of the tank. It should be noted, too, that while the stationary wave in Fig. 4 has but one nodal line, it is possible to have stationary waves with two or more nodal lines. Suppose two tanks like that in the figure be placed end to end. Stationary waves may now be started in each in such wise that the movements at the contiguous ends coincide exactly. Clearly the partition walls between the tanks may now be removed and the movement in the enlarged tank will consist of a stationary wave with two nodal lines.

If a stationary wave is started in a tank of water it is found that the period of oscillation is a function of the length of the tank and of the depth of the water, the formula for a rectangular tank of uniform cross section being $T = 2L/\sqrt{gd}$, in which T is the period of oscillation, g the acceleration of gravity, and d the depth of the water. Furthermore, if a given periodic force acts on a number of different tanks of water, the wave movement will be best developed in that tank which has a period most nearly approximating the period of the force.

Now to come back to the tide, the stationary-wave theory states that the dominant tides of the world arise from stationary wave oscillations which are set up and maintained in various portions of the oceans by the periodic tidal forces of sun and moon, these oscillating areas having periods of oscillation which are approximately the same as the periods of the tide-producing forces. The most complete exposition of this theory is found in the works of the American tidal

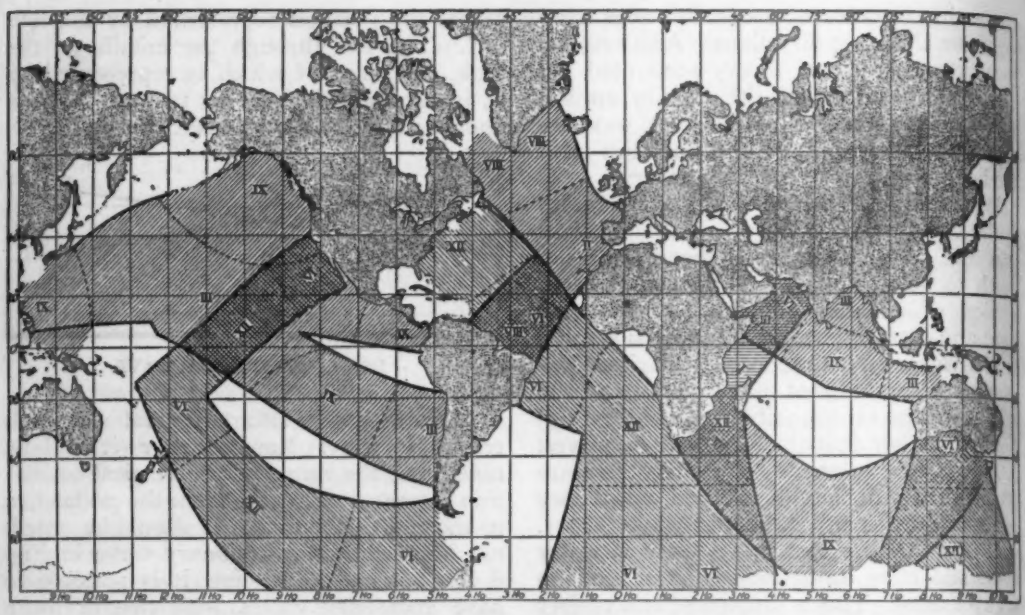


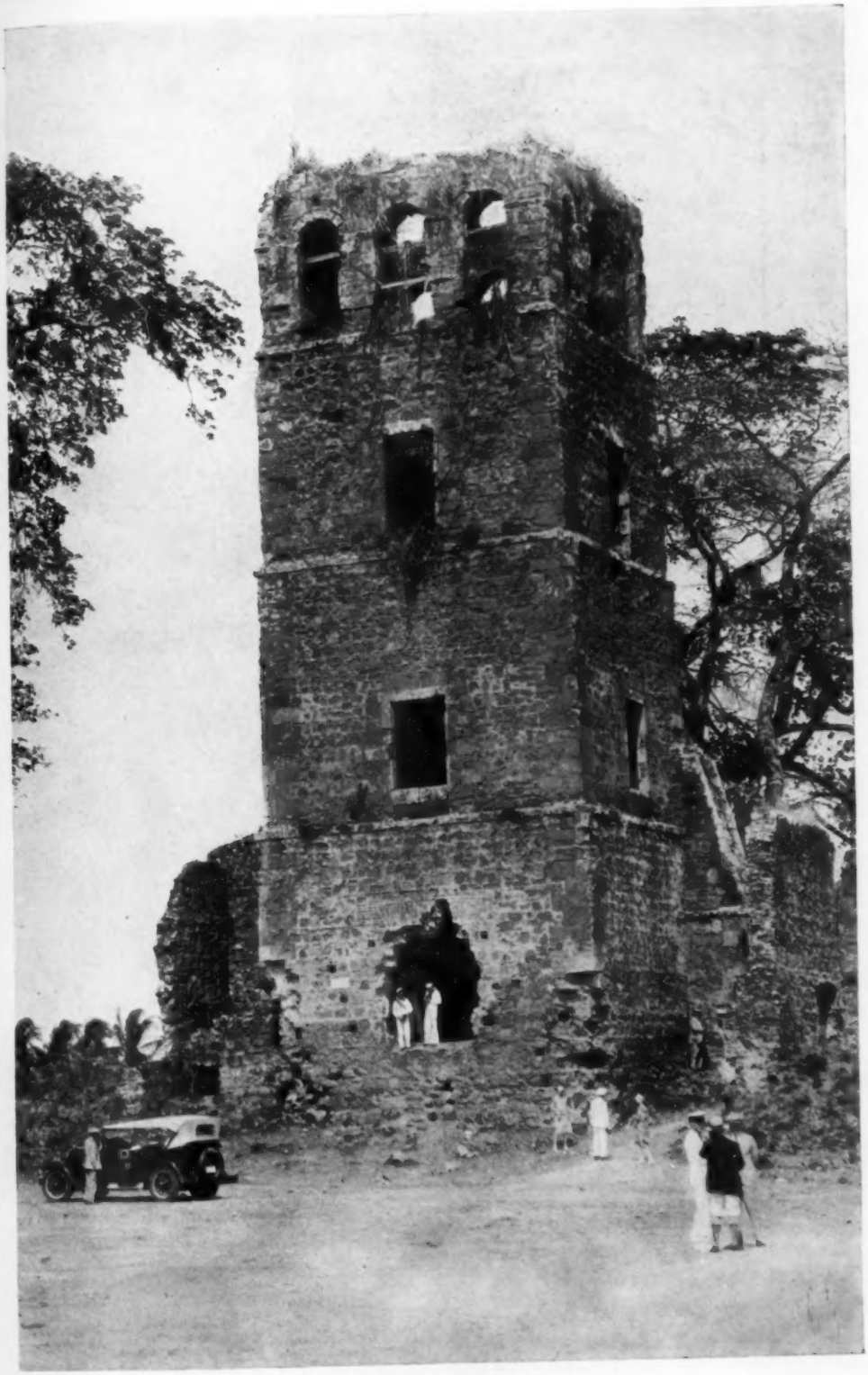
FIG. 5. OCEANIC OSCILLATING SYSTEMS FOR THE SEMI-DAILY TIDE-PRODUCING FORCES, ACCORDING TO HARRIS

mathematician, R. A. Harris, and in Fig. 4 are shown the oceanic oscillating systems as developed by Harris for the semi-daily tides.

The Roman numerals on the oceanic oscillating systems of Fig. 5 denote the lunar hours of high water over the areas indicated. Several of the oscillating systems overlap, and these are distinguished by different kinds of shading. The nodal lines about which the various systems oscillate are indicated by dashed lines across the shaded areas. The unshaded parts of the ocean are areas of such size and depth that the direct action of the tide-producing forces on these areas can produce but little tide. In these regions, therefore, the tides that occur are due to the tides originating in the neighboring oscillating areas.

A number of puzzling tidal features in various parts of the world are nicely explained by the stationary-wave theory. Applying it to the tides at Panama we see first, that the Atlantic end of the canal opens into the Caribbean Sea which is effectually cut off from the oscillating system of the open Atlantic by the girdle of islands that mark off the northern and eastern limits of the Caribbean. Furthermore, the Gulf of Mexico and the Caribbean constitute an area of such length and depth as to have a period of oscillation of approximately twenty-four hours. Hence this area will respond best to the daily tide-producing forces, and here we have the explanation of the relatively large daily constituent of the tide in the Caribbean Sea.

The basin comprising the Caribbean Sea and the Gulf of Mexico is much smaller and much shallower than the basins of the Atlantic and Pacific oceans. Hence the tides raised by tide-producing forces in the former are much smaller than in either of the latter. The Atlantic end of the canal therefore lies in a region characterized by small tides and by a relatively large daily constituent. The Pacific side of the canal, however, as a glance at Fig. 5 shows, is situated at the end of an oscillating system of the semi-daily tides. This means that the range of the semi-daily tide here must be considerable. On the basis of the stationary-wave theory, therefore, the very considerable differences in the range and characteristics of the tide at the two ends of the Panama Canal find reasonable explanation.



P. and A. Photos

RUINS OF OLD PANAMA

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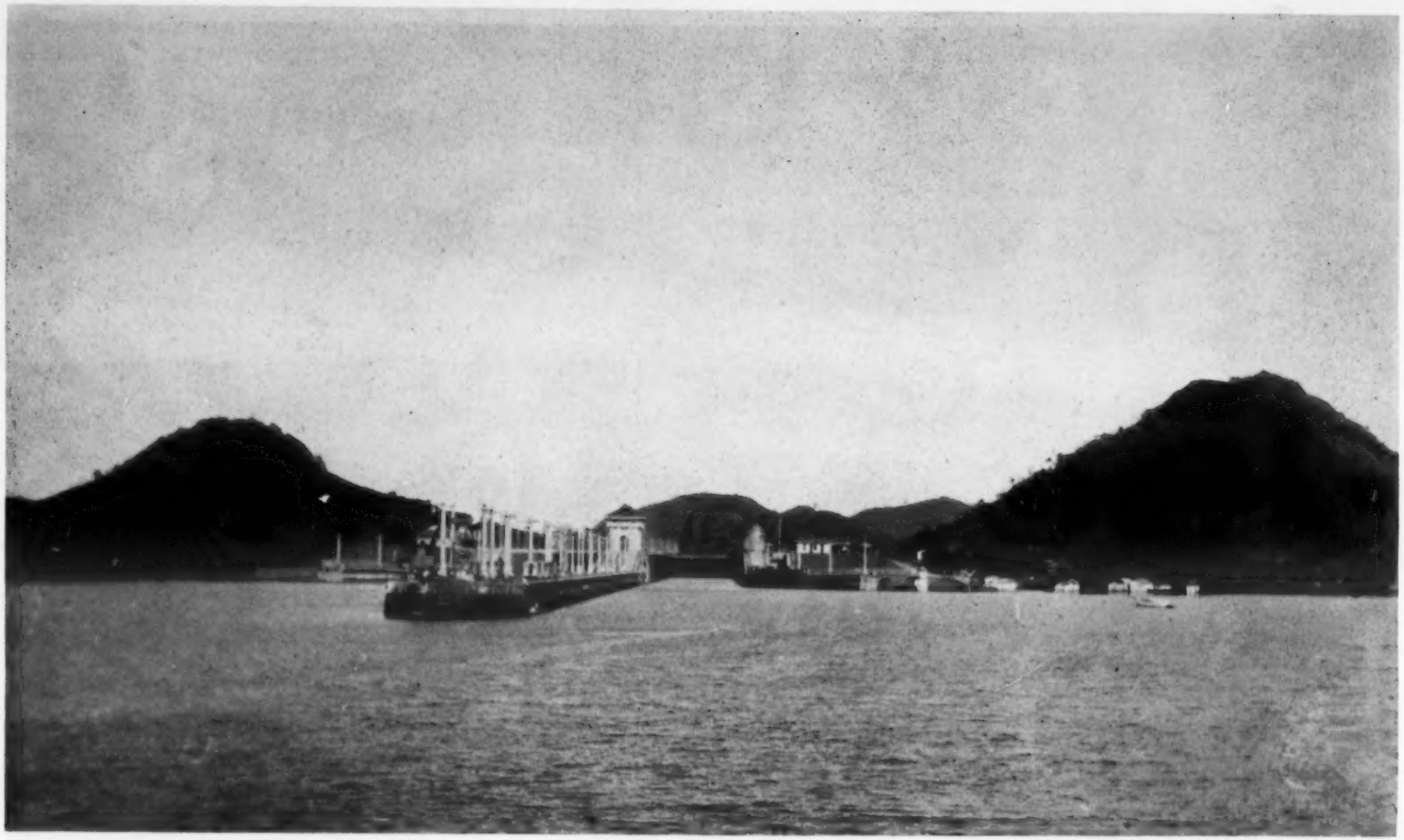

Courtesy Chief Boatswain J. D. Thompson, U. S. Navy

APPROACHES TO PEDRO MIGUEL LOCKS
Transit from Pacific to Atlantic.

Courtesy Chief Boatswain J. D. Thompson, U. S. Navy

APPROACHES TO PEDRO MIGUEL LOCKS
Transit from Pacific to Atlantic.

Courtesy Navy Recruiting Bureau, New York

A BATTLESHIP PASSING THROUGH CULEBRA CUT

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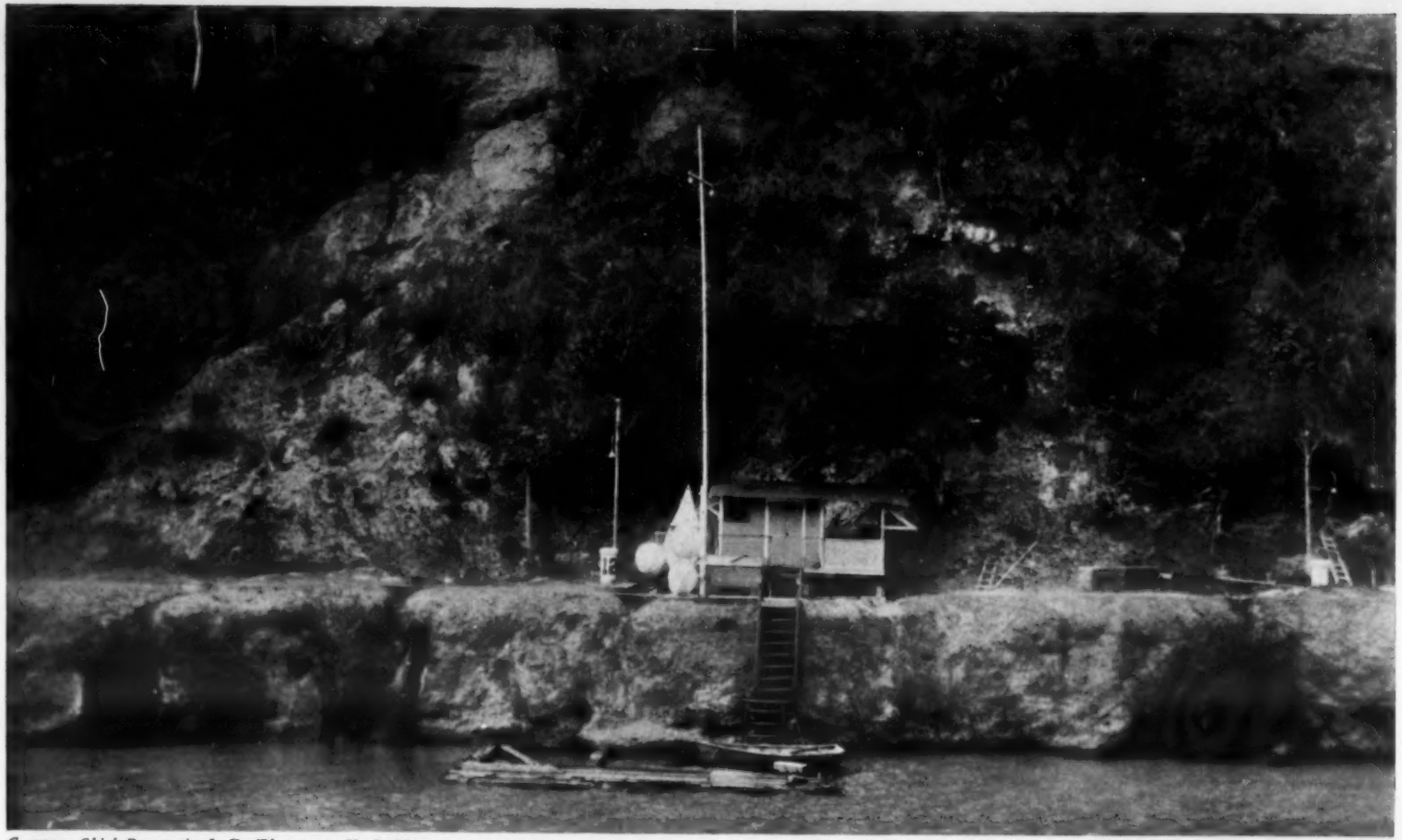


Courtesy Chief Boatswain J. D. Thompson, U. S. Navy

SIGNAL STATION ON THE BANK OF THE PANAMA CANAL

Courtesy Chief Boatswain J. D. Thompson, U. S. Navy

SIGNAL STATION ON THE BANK OF THE PANAMA CANAL

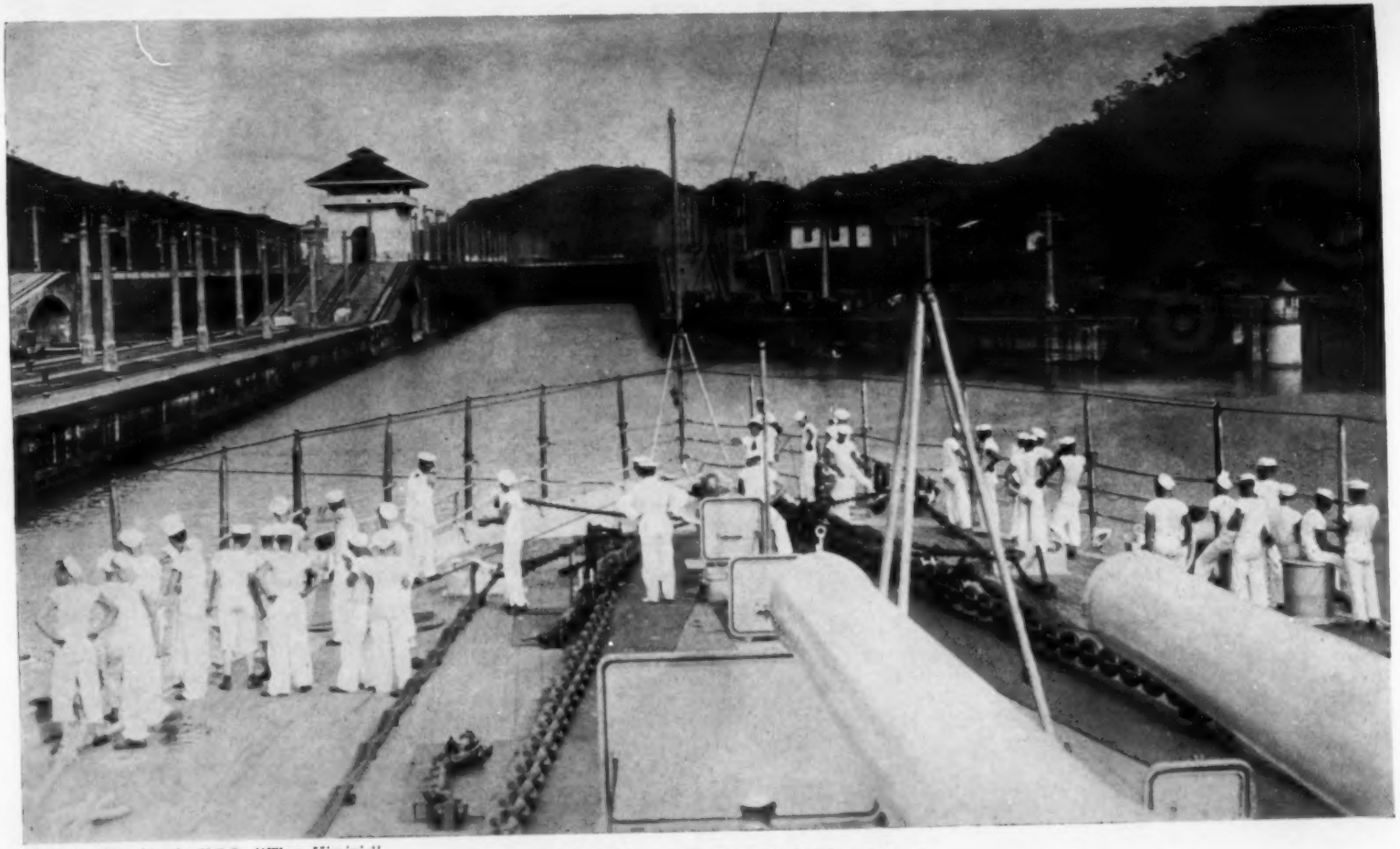


Photo by Woodward, U.S.S. "West Virginia"

APPROACHING PEDRO MIGUEL LOCKS, 1930

Courtesy Navy Recruiting Bureau, New York

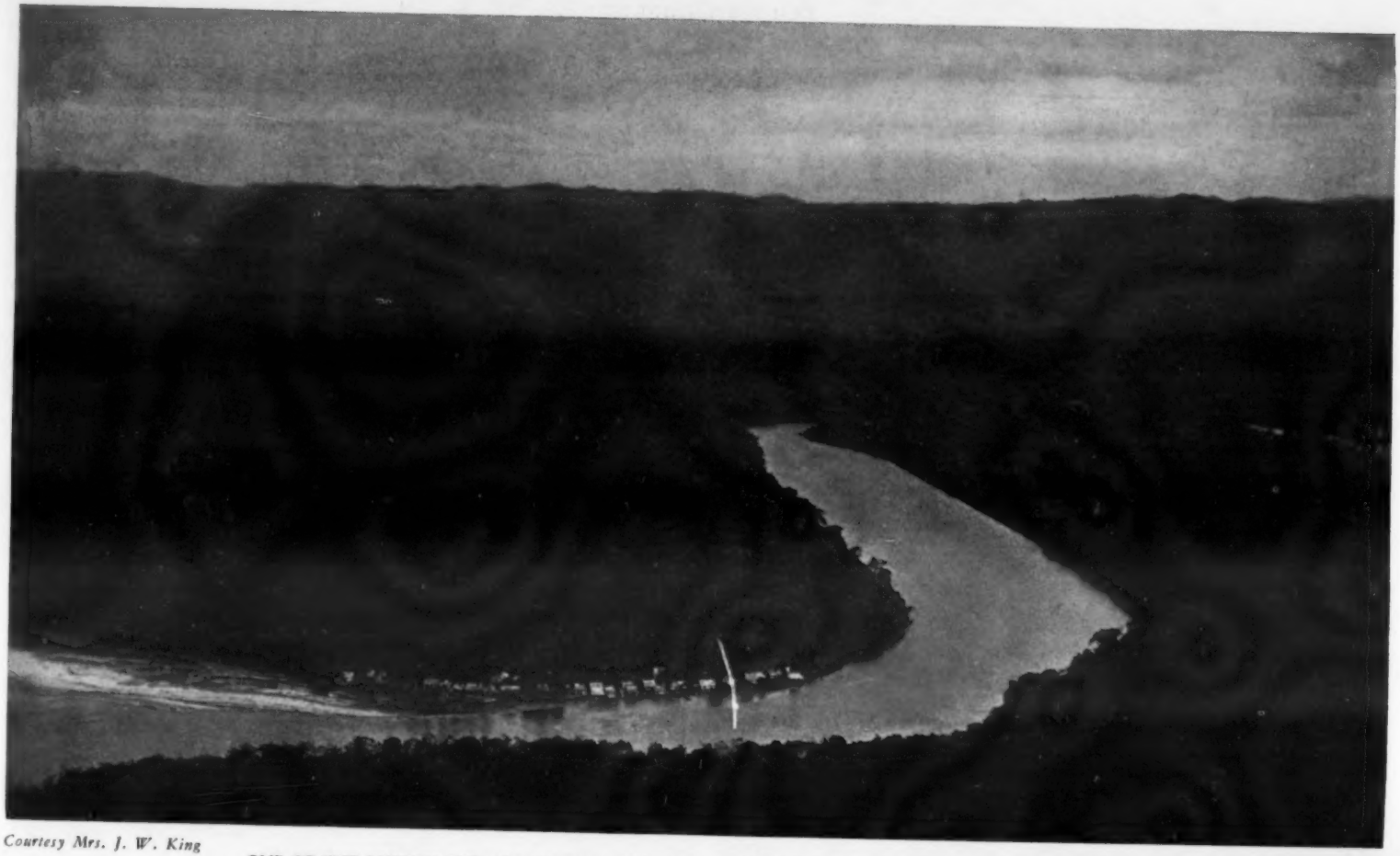
COALING DOCK AT BALBOA, CANAL ZONE

Courtesy Navy Recruiting Bureau, New York

COALING DOCK AT BALBOA, CANAL ZONE

Courtesy Mrs. J. W. King

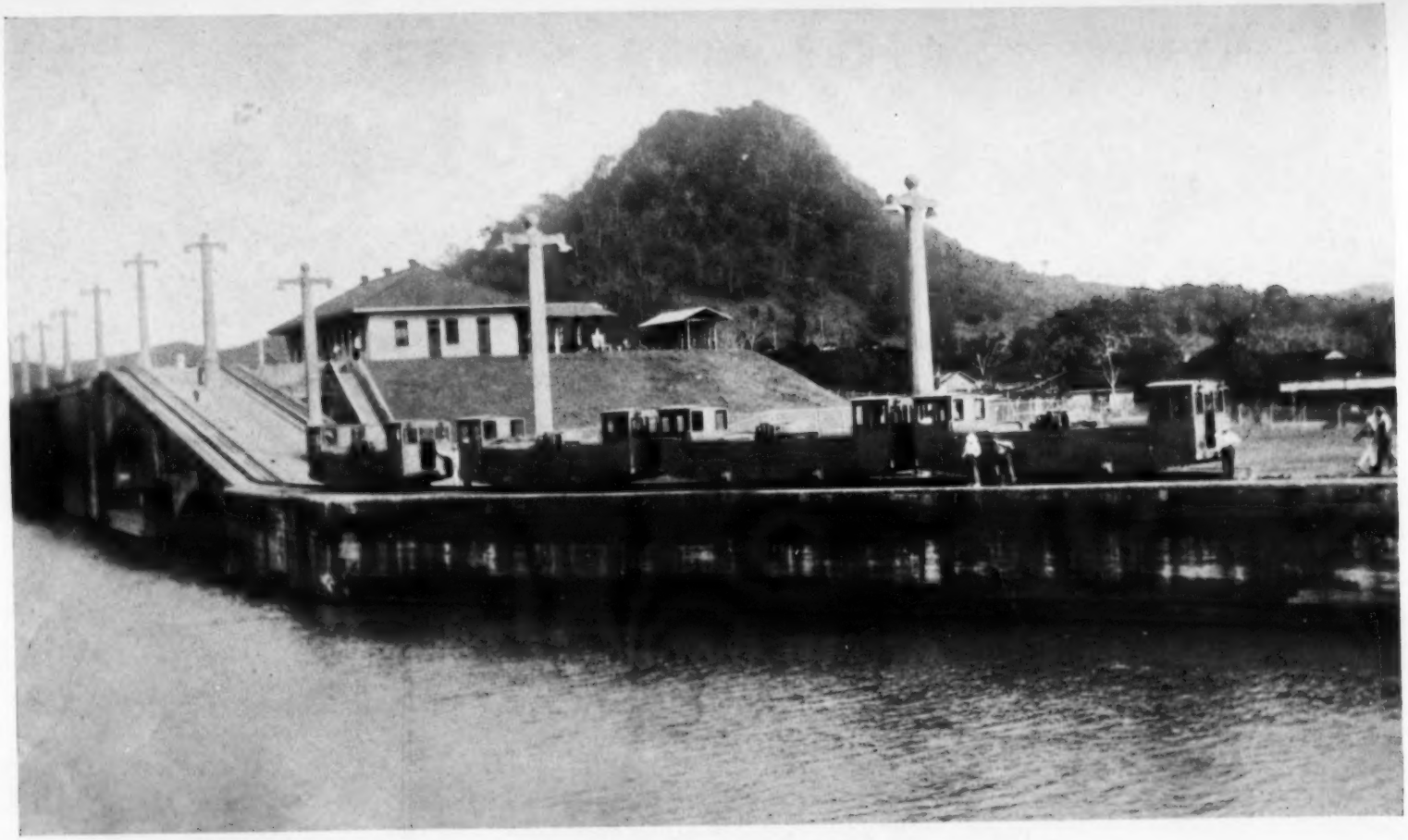
AN OLD SPANISH FORT



Courtesy Mrs. J. W. King

ONE OF THE SOURCES FOR ADDITIONAL WATER IF IT SHOULD BE NEEDED FOR THE PANAMA CANAL

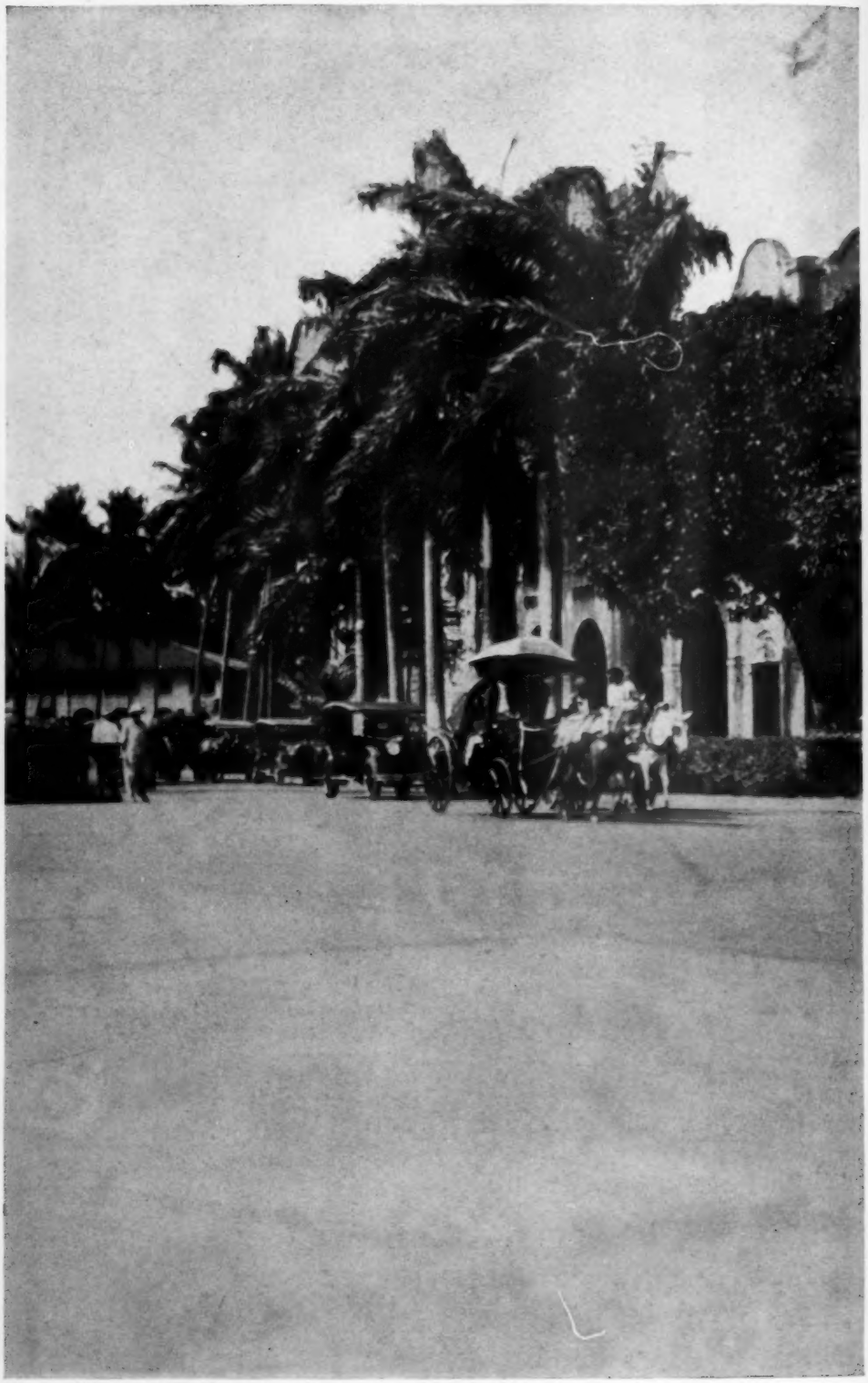
ONE OF THE SOURCES FOR ADDITIONAL WATER IF IT SHOULD BE NEEDED FOR THE PANAMA CANAL



Courtesy Chief Boatswain J. D. Thompson, U. S. Navy

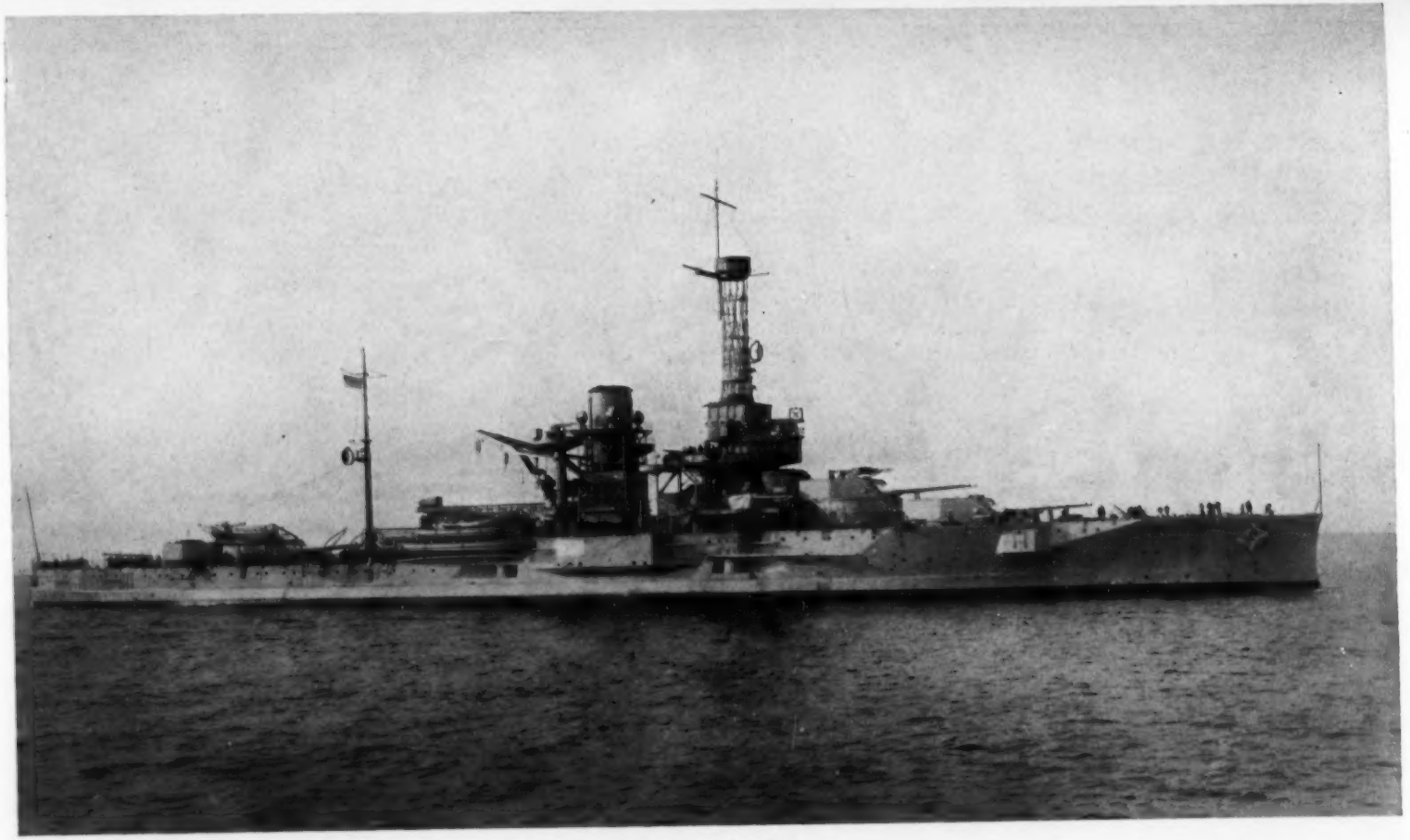
ELECTRIC "MULES"

They are lined up ready to pass lines at Pedro Miguel Locks. Four are used on each side.



Courtesy Navy Recruiting Bureau, New York

STREET SCENE, CRISTOBAL, CANAL ZONE



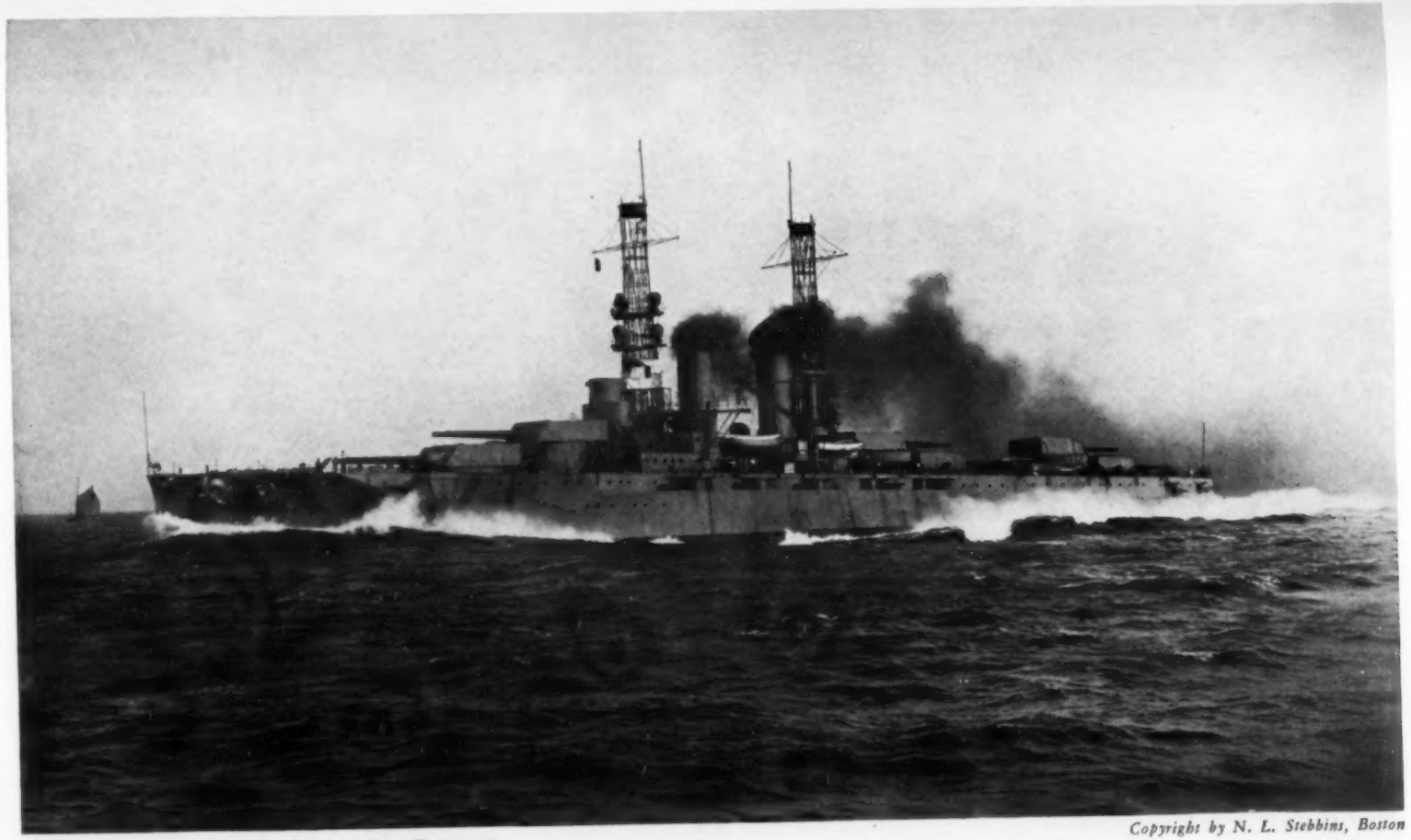
Courtesy Bureau of Construction and Repair, Navy Department

U.S.S. *UTAH*

UNIV. OF MICH.

Courtesy Bureau of Construction and Repair, Navy Department

U.S.S. *WYOMING*



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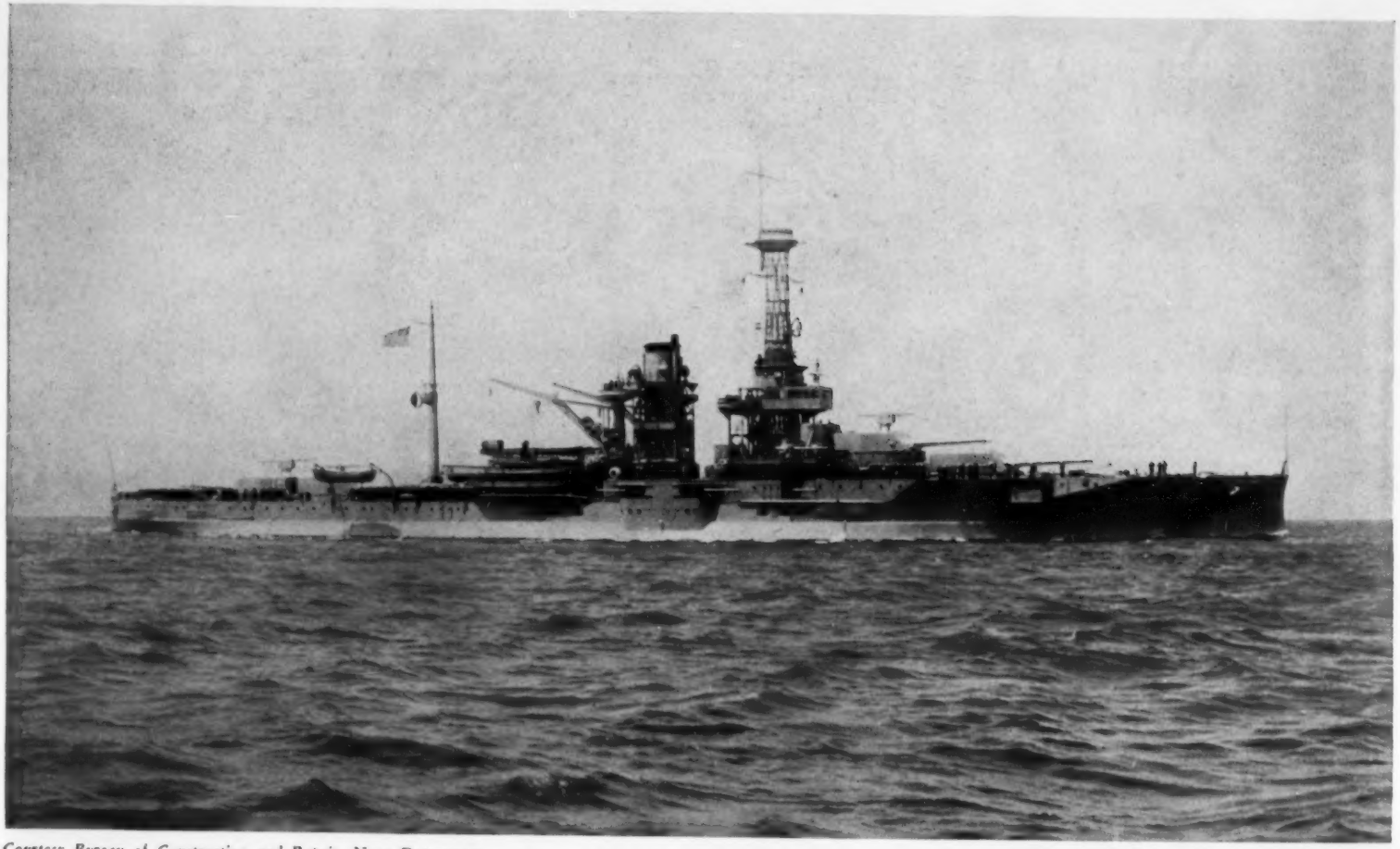
U.S.S. *WYOMING* (BEFORE MODERNIZATION)

UNIV. OF MICH.

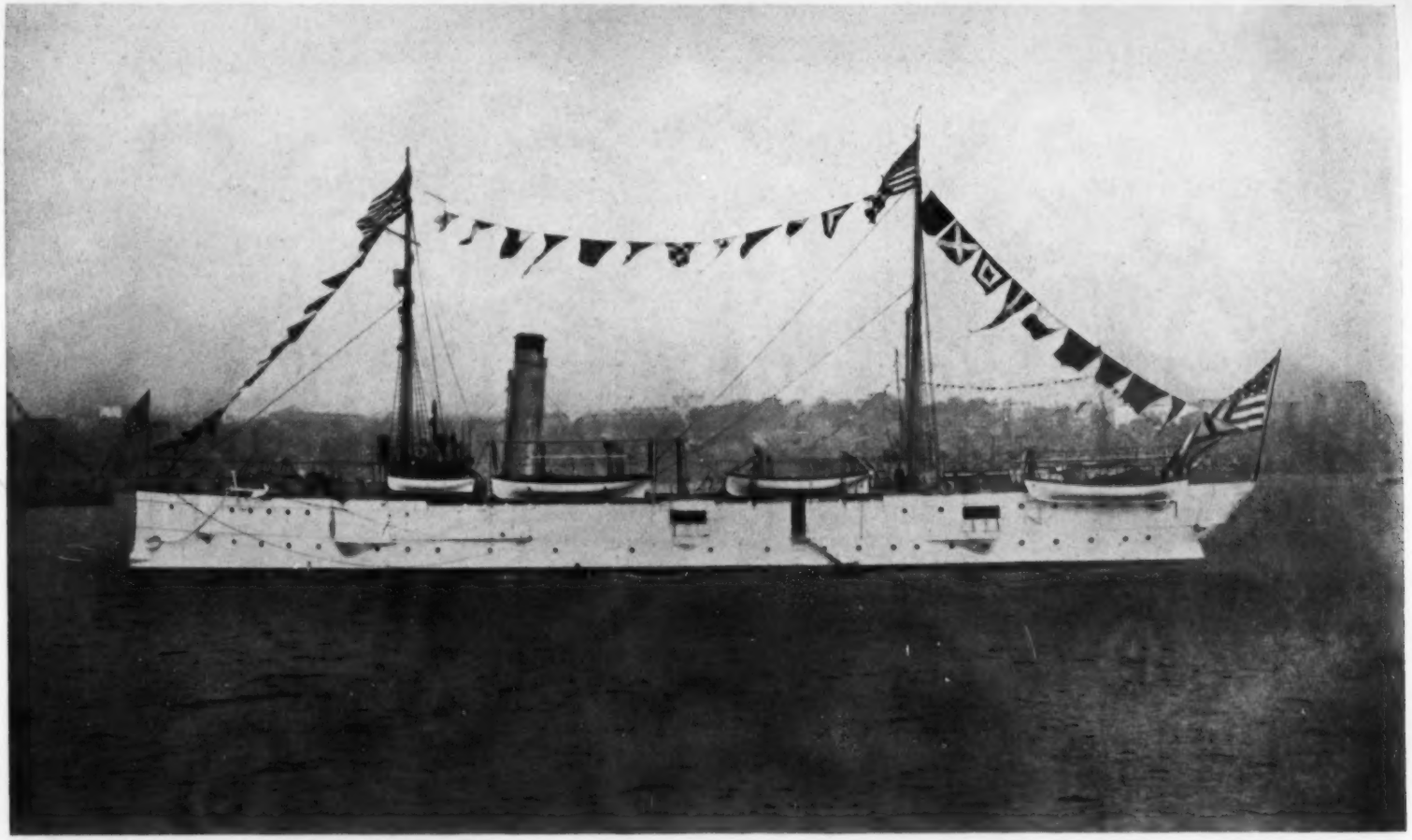


Courtesy Bureau of Construction and Repair, Navy Department

U.S.S. *FLORIDA*

Courtesy Bureau of Construction and Repair, Navy Department

U.S.S. *FLORIDA*



Courtesy Bureau of Construction and Repair, Navy Department

U.S.S. *MACHIAS*

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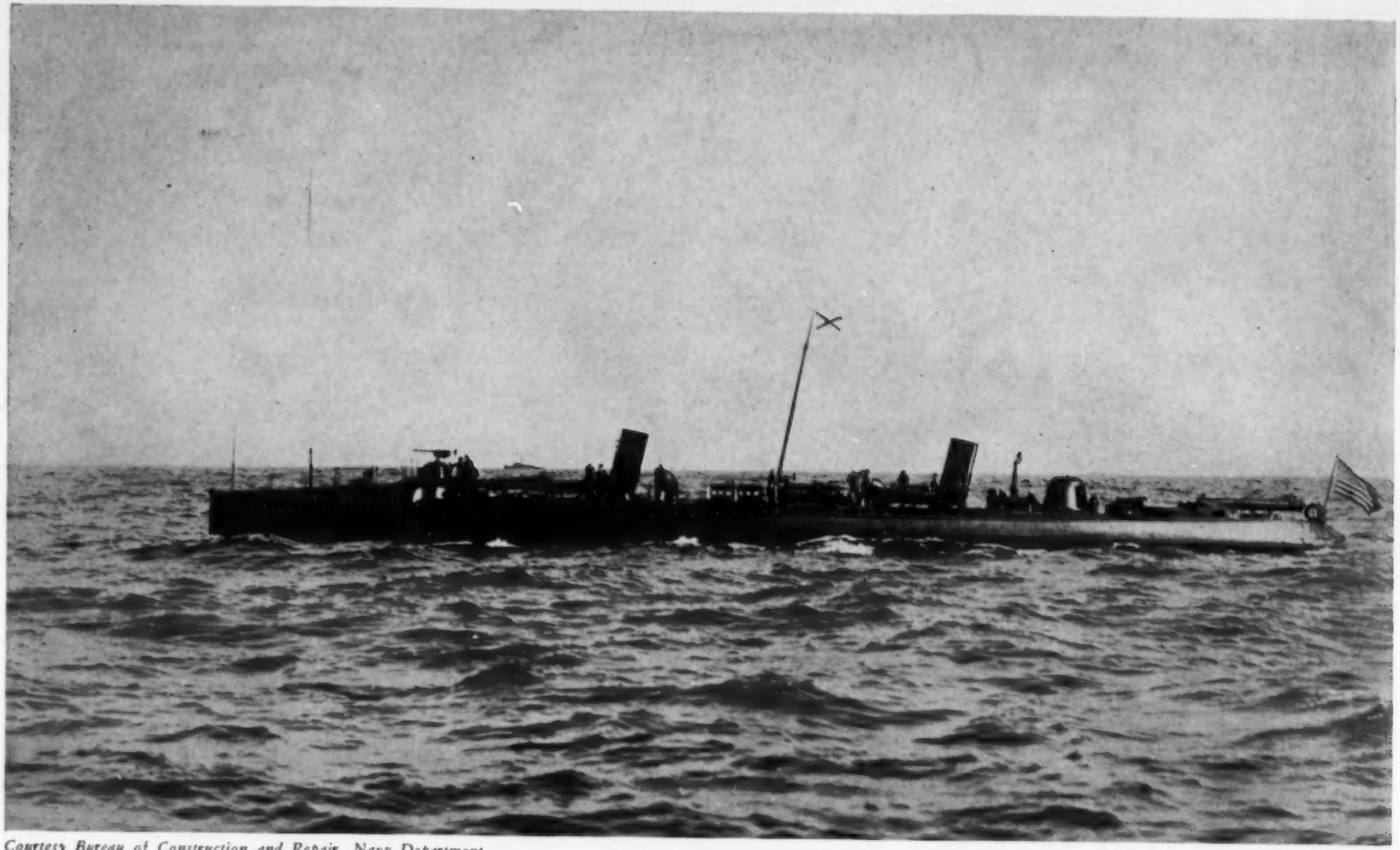


Courtesy Bureau of Construction and Repair, Navy Department

U.S.S. *WINSLOW*
(Torpedo-Boat in Spanish-American War.)

The Gallant Fight *of the Winslow at* Cardenas

By CARLOS C. HANKS

THE Spanish-American War engagement of the little torpedo boat *Winslow* at Cardenas, May 11, 1898, apears as a noteworthy result of measures taken by United States naval authorities to distribute vessels along the northern line of the Cuban blockade in sufficient force to discourage attacks by Spanish gunboats upon the smaller units of our blockading forces.

During this period of reassignment of stations, it happened that, by May 8, only the small converted yacht *Hornet* and the torpedo boat *Winslow* commanded by Lieutenant John B. Bernadou, U. S. Navy, comprised the patrol off Matanzas. These two vessels took stations some five to seven miles apart at night to cover the harbor approaches, and were thus individually exposed to attacks from enemy gunboats known to be lying at Cardenas.

The *Winslow* had been commissioned at Norfolk on December 29, 1897, and after a trip to Newport for her torpedoes, she had proceeded to Key West, arriving there in March 1898, where she remained until war was declared.

This little vessel was 160 feet long, had only a ten-foot beam and a shallow draft of seven feet. She mounted three torpedo tubes, one on each bow and one astern; and three one-pounder Hotchkiss quick-firing guns, one mounted forward on the conning tower, and one on each beam. Her crew numbered twenty-one officers and men.

The ship developed a speed of 24.8 knots on her trials, and was powered by two triple-expansion engines drawing steam from two water-tube boilers. Each was enclosed in a separate compartment and her hull was also divided by nine transverse bulkheads.

The *Winslow*, like all vessels of her class, was without protection save for that afforded by the two conning towers, one forward, the other aft, made of half-inch steel plating.

On May 10 the two vessels were reenforced by the arrival of the armed tug *Uncas* from Key West, and, with a consort thus provided for the *Hornet*, the *Winslow* departed for Cardenas to secure some coal from the gunboat *Machias*, Commander Merry.

Arriving at Cardenas, on the morning of the eleventh, Lieutenant Bernadou found the *Machias* about to sail for Matanzas, and the *Winslow* was directed to apply for fuel to the gunboat *Wilmington*, which had just arrived on the station.

Commander Todd, of the *Wilmington*, had other things on his mind beside refueling torpedo boats, however, and he informed the commander of the *Winslow* that he intended to enter Cardenas Harbor that day, depth of water permitting, and undertake the destruction of Spanish gunboats and other shipping.

The Navy had received reports that the main entrance channel between Chalupa and Diana cays had been mined; and that mines would probably be found in the second channel between Diana and Mangle cays.

There remained a third channel, the shallowest of the three, between Romero and Blanco cays, and the chart gave this channel a depth of only one and a quarter fathoms at low water. If this was correct, the *Wilmington*, which drew about nine feet, ten inches, could safely navigate the channel to the harbor at high water. However, Commander Todd ordered the *Winslow* in company with the revenue cutter *Hudson*, to sound the channel.

This operation was carried out without molestation from the Spaniards, and Lieutenant Bernadou reported to his senior that the gunboat could safely use the entrance.

U.S.S. *WINSLOW*
(Torpedo-Boat in Spanish-American War.)

Before 2:00 P.M., the *Wilmington* started in toward the town with the *Winslow* and *Hudson* taking station on each side of her, to give warning in case the water suddenly shoaled.

The passage was uneventful, however, and once in the harbor, Commander Todd dispatched the torpedo boat and cutter on eastern and western courses to skirt the circular shore of the bay, while the *Wilmington* took the middle course directly toward the town of Cardenas.

The three ships had proceeded but a short distance when Commander Todd sighted the outlines of a gunboat tied up at a wharf, and signaled the *Winslow* to close her. The *Wilmington* then changed her course away from the torpedo boat's line of advance, so that she could use her heavier guns if the Spaniards opened fire. The *Winslow* started in at once, heading directly toward the enemy's gunboat.

The first shot of the engagement was fired from the Spaniard's bow gun at about 2:30. This was followed immediately by a heavy and long-sustained fire from enemy shore batteries located at different points along the water front of the town. The Spaniards were using smokeless powder, and it was impossible to spot the exact location of their guns, although reddish dust clouds rose to indicate the movement of troops over the clay roads into town.

When the *Winslow* had approached to about twelve hundred feet from the shore, she encountered a field of anchored range marks. At this time a shell, coming from dead ahead, and apparently from a six-pounder fieldpiece, crashed through the torpedo boat's bows, and bursting fragments pierced the lower face of the forward conning tower, cutting steam lines and wrecking the steam steering gear.

Daniel McKeown, the quartermaster at the wheel, had a miraculous escape from death. The concussion threw him out the door, but except for minor bruises, he was unhurt.

This hit compelled the use of the steering gear in the after tower. Several men were required to make the connections, and while they were busy in the petty officers' quarters aft, a shell burst against the after tower, carrying away the wheel ropes and scattering the men working below.

Fragments of the same shell jammed the rudder hard over, and, use of relieving tackles hooked to the tiller proving ineffective, the little ship could only be steered by using the engines. All these injuries had come within a very few minutes during which the ship had gone ahead only a few hundred yards.

Lieutenant Bernadou had remained forward to direct the fire of his guns, and to work his ship, and just after the injury of the after conning tower, a water tender, William O'Hearn, reported to him that a shell had gone straight through the forward boiler, and had burst in the furnace, scattering burning coals about the fireroom. The fireroom force were probably saved from being scalded by the forced draft system, which drove the escaping steam up the stacks.

After making his report, O'Hearn, together with machinist's mate, Thomas Cooney, dropped into the stifling heat and smother of the fireroom, and extinguished the smoldering coals, as well as the little fire remaining in the furnace.

The torpedo boat's puny armament of one-pounders was maintaining a steady fire, first at the gunboats, which failed to leave their wharf, and later at the shore batteries as they were unmasked.

The next hit received by the *Winslow* put her forward engine out of service, when a shell entered the engine, burst in the low pressure cylinder and spiked it. This damage left the vessel with but one engine, without wheel-ropes or steering gear and with her rudder jammed. Further progress toward her objective was impossible. In fact the torpedo boat was in danger of being reduced to a complete wreck by the heavy and well-directed fire of the enemy.

Lieutenant Bernadou, who had been wounded in the thigh by shell fragments, decided that it was time to withdraw his ship, especially since his small crew now included a number of men who were more or less seriously wounded. He decided to attempt his retirement by alternately backing and going ahead—thus working out on a zigzag course. This maneuver made a moving and more difficult target of his boat, but required extreme care in its execution, for there was danger of blanketing the fire of either the *Hudson* or *Wilmington*.

Ensign Worth Bagley, executive officer, was stationed at the engine-room hatch so

that he could con the man at the throttle and be sure that he operated the reversing gear as directed.

In this way, the *Winslow* worked out about four hundred yards toward the *Hudson's* station. That vessel, little more than a big, sea going tug, had drawn inshore as far as her draft would permit, and was energetically using her six-pounder against the enemy batteries, who practically ignored her, preferring to concentrate their fire on the crippled *Winslow.*

The *Hudson* was struck by only a few small caliber projectiles and Commander Todd's report of the engagement does not mention any hits scored on the *Wilmington,* although that ship was well within range throughout the engagement.

Working close to the *Hudson,* Lieutenant Bernadou hailed her and directed that she tow the *Winslow* out of range. The revenue cutter shortly ranged alongside, took and secured the latter's hawser, and started ahead. This line parted, as she attempted to swing the torpedo boat's bow around. The continued hot fire from enemy batteries compelled the *Winslow* to return to her tactics of backing and going ahead while a second hawser was broken out.

At the time the first line parted, a group of firemen and engine men, ordinarily employed in the now disabled forward boiler and engine rooms, were clustered about the deck near the engine-room hatch where stood Ensign Bagley. These men had been assigned to pass ammunition and help with the hawsers.

As four of them were passing Ensign Bagley's position, an armor-piercing shell, coming from abaft the beam, ripped into the deck and exploded. The officer and four men were caught in the cone of fragment dispersion; Bagley and two others were killed and two were fatally wounded.

Lieutenant Bernadou, himself weakened by loss of blood from his wounds, hastened to his fallen men. A glance convinced him that his executive was dead, and he directed that the bodies be covered with the torpedo-tube covers, while the wounded were given first aid.

Shortly after these fatalities, the *Hudson* once more ranged alongside, received the *Winslow's* second line, and, without further accident, towed the battered torpedo boat to a station near the *Wilmington.* In response to signals, a boat from the *Wilmington* brought a medical officer to care for the wounded, and at his direction they, together with the dead, were transferred to the gunboat.

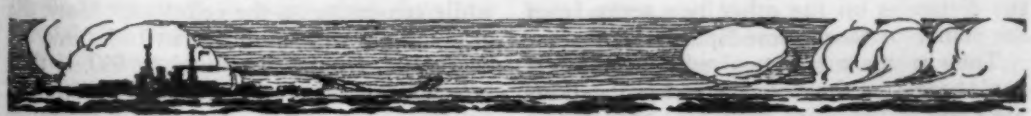
Damage from hostile gunfire had not been confined to the American ships, however, for, sometime before the end of the fight, a slackening of fire from the shore batteries had been noted, and about the time the *Winslow* had been towed clear, it ceased entirely. In fact the last shots from the American ships awakened no reply.

Two Spanish gunboats, the *Lealtad* and *Antonio Lopez,* were riddled at the wharf. As there was only about a foot of water under their keels, their battered hulks rested in the mud. A large section of the town of Cardenas was also seen to be in flames. At the close of the action, the ships resumed station off Piedras cay.

The action resulted in the destruction or dispersion of enemy naval forces at Cardenas, thus assuring an unhampered blockade of that section of the coast.

After his wounded had been transferred to the *Wilmington,* Lieutenant Bernadou was compelled to surrender the command of the little ship he had fought so well, to her chief petty officer, Gunner's Mate G. P. Brady, and go himself to the gunboat for medical attention.

In the death of Ensign Worth Bagley, the Navy lost a gallant and a promising young officer. His body, and those of the brave men who died with him, were transported to Key West to find resting places in the earth of their homeland.



Make *it* Yourself

By COMMANDER RALPH C. PARKER, *U. S. Navy*

THE following protractor, course indicator, or whatever you may choose to call it, was made to fill the personal need for a quick method of solving the problems of maneuvering and torpedo control, thereby anticipating the prolonged manipulation of dividers and parallel rulers at the chart board, or the no less elaborate fumblings at the torpedo director. The geometry of it is older than Euclid, and the practical use is similar to that of the old Battenberg protractor and probably to many "gadgets" dear to the heart of their creators.

General Description (See Fig. 1). It consists of a graduated compass circle marked in degrees, with a central spindle on which three arms revolve freely. The narrow *target arm* and *own ship arm* revolve around the spindle as diameters of the compass circle. One end of each forms a pointer following the graduated circumference of the compass circle, while the other end, which we will call the Speed End, has marks or Speed Points at distances from the center corresponding to speeds from zero to thirty knots or over.

The broad arm, or *bearing arm*, revolves about the spindle at the middle of one edge, which edge is also a diameter of the compass circle. The broad part away from the spindle is marked with a series of *bearing lines* parallel to the edge. When in operation the Speed Ends of the other two arms extend across the *bearing arm*, and the Speed Points will be interspersed among the *bearing lines*.

It will be seen that the *bearing line* connecting any two Speed Points forms one side of a triangle whose other two sides are the distances on the other two arms from the center to those same Speed Points.

Then if these last two sides of the triangle represent the direction and proportionate speed of two ships or moving bodies, and the third side represents the direction or bearing between them, we have the graphic solution for all the problems involving collision courses and constant bearings.

The course and speed of the target must be known or estimated, and the *target arm* set for them. The other three elements are the target bearing, and our own ship's (or torpedo's) course and speed. With any two of these elements known or assumed, the third may be readily found.

Tools and Material. Go to any auto-top repair shop and buy about a square foot and a half of the transparent celluloid used for side-curtain windows. From the moving picture repair shop on the tender or elsewhere procure a small amount of the cement or "dope" used for mending films. This will stick to celluloid much better than ordinary glue and is itself transparent, though glue may be used, lacking anything better.

For the graduations of the compass circle use either the 8-inch compass rose from an old plotting chart or the 10-inch circle from one of the mooring board sheets.

For the spindle use a small bolt and nut, diameter of shank about ⅛-inch. Flatten or file down the bolt head so that it will lie flat underneath the celluloid circle.

Assemble the following tools and materials: knife, shears, pen and India ink, graduated rule or straight edge, sharp-pointed instrument for scribing lines on celluloid, awl and reamer for boring holes, sheet of cross-section paper, dividers, and fine sandpaper or emery cloth.

Compass Circle. Cut the paper degree circle roughly out of the chart or mooring board sheet, leaving a margin of two or three inches or more outside of the graduations all around to help keep it from distortion while cementing to the celluloid. Mark the graduations with numbers in India ink for every 10°, from 000 around to 360, if they are not already so engraved. Then cut out the inside of the paper circle to within about ½-inch from the outside graduations all around. Now scribe and cut out

evenly from the celluloid a solid circle slightly larger than the circumference of the outside graduations of the degree circle.

Lay the paper degree circle face up on a flat surface, spread its upper (engraved) side evenly with the cement, then carefully place the celluloid circle upon it, even with the circumference outside the graduations. Press under books or other weights until the cement sets, which will take only a few minutes.

Remove and trim off the paper and celluloid margin flush with the degree circle. The completed compass circle should now be about an even eight inches or ten inches in diameter, with the ½-inch ring of the degree circle pasted on its under side and the degree graduations showing through. Find its exact center by scribing cross diameters, punch a small center hole and ream it out to a close working fit on the spindle, using care to keep the hole exactly centered as you enlarge it. Do *not* try to bore the hole first and then paste on the degree circle concentric with the hole, or you will probably get the whole thing off-center. Accuracy of workmanship is essential to accurate performance of the completed instrument.

Bearing Arm. Cut out a celluloid rectangle, in length equal to the outside diameter of the compass circle (eight inches or ten inches), and in width about ½-inch wider than its radius. (See Fig 1.) Half an inch from one side and midway between the ends, punch and enlarge a center hole to fit the spindle. Put it on the assembled spindle and compass circle, and mark and scribe an accurate diameter from end to end across the center, parallel to the long edge. This line is the first *bearing line.* Then proceed to scribe a series of other *bearing lines* exactly parallel to the first one, and at a uniform distance apart of ⅛-inch if an 8-inch compass circle is being used, or 0.15-inch apart with a 10-inch compass circle. Any distance apart would work so long as the lines are parallel, but these distances are recommended. A simple method which avoids stepping off so many small distances is to lay the celluloid down accurately on a sheet of cross-section paper of the right spacing, and scribe with a straightedge directly over the lines of the paper as they show through.

Scribe every fifth line slightly broader and deeper, and with a pen and India ink darken these fifth lines to make them more pronounced. Trim off the half-inch unruled strip beyond the first *bearing line,* but leave a semicircular boss of ½-inch radius around the center hole.

Target Arm and Own Ship Arm. Cut out two celluloid strips about an inch or an inch and a quarter broad, and in length equal to the diameter of the compass circle. (See Fig. 1.) At the middle point of each strip punch and enlarge a center hole to fit the spindle. Assemble them on the spindle with the compass circle and mark and scribe an accurate diameter lengthwise on each. Narrow an end of each to form a Pointer End. On the opposite ends, which we may call the Speed Ends, step off and mark with light punch marks or scratches a series of Speed Points corresponding to speeds from zero to thirty knots, measuring from the exact center of the hole. The distance between the Speed Points should be the same as that between the lines on the *bearing arm,* i.e., either ⅛-inch or 0.15-inch. The five-knot point will thus be either ⅝-inch or 0.75-inch from the center, etc. Mark every fifth Speed Point with a longer scratch.

Measuring Scale. Cut from the celluloid a strip about one inch wide and about as long as the diameter of the circle. Along one edge of this mark a scale of distances of the same length as those on the speed scales, ⅛-inch or 0.15-inch apart. (See Figs. 5 and 8.)

On the other edge mark a scale of Effective Torpedo Range in thousands of yards, each space computed according to the formula:

$$1000 \text{ yds} = \frac{\text{torpedo speed} \times \text{length of knot spaces}}{\text{maximum torpedo range (thousands)}}$$

For a 25-knot, 12350-yard torpedo and the knot points ⅛-inch apart it would be 0.253-inch. For a 6000-yard, 35-knot torpedo, with knot marks 0.15-inch apart it would be 0.875-inch.

Make a hole in one end of the scale whereby to hang it to the bottom of the spindle with a small lanyard, so as to have it on hand when needed.

Save the remains of your celluloid to make other attachments and accessories as they occur to you.

Markings. To put lettering or ink lines on celluloid, the glossy surface should first be dulled by rubbing the place with fine sandpaper or emery cloth, or by first apply-

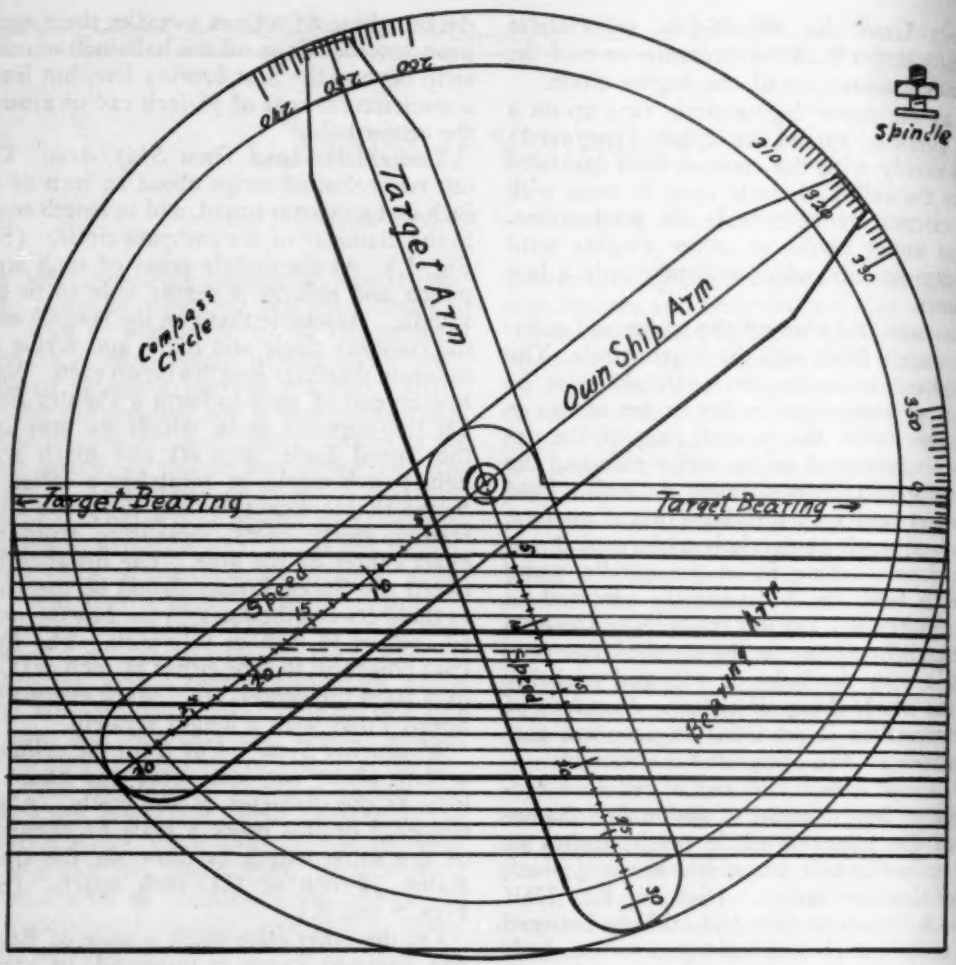


FIG. 1.

ing talcum powder or powdered soapstone, as you do with tracing cloth.

On the pointer end of one of the arms print *Target Course,* and on the other arm print *Own Ship Course.* On the Speed Ends fill in each Speed Point with a dot of ink and also the scratches at every fifth Speed Point, numbering the latter 5, 10, 15, 20, etc., for easier identification.

On the *bearing arm* close along the inner edge which forms a diameter of the compass circle, print *Target Bearing* on each side of the spindle. (See Fig. 1.)

Practical Use. The methods of using the instrument may best be explained by examples, as follows:

(a) Another ship bears 000°, course 250, speed 12. I wish to join her at 18 knots. What will be my collision course?

Set the *target arm* at 250 and the *bearing arm* at 000. Then move *own ship arm* until 18-knot Speed Point is on the same *bearing line* as the 12-knot point on the *target arm,* on the side *away* from the bearing. The Pointer End then indicates 321 on the compass circle, which will be the correct collision course. (See Fig. 1.) Note that in any of these problems the two Speed Points may not fall exactly on a *bearing line;* but if they are brought by eye the same distance between two adjacent lines, the effect will be the same.

(b) Data is the same as in (a), but I wish to open out on the target ship instead of closing, while maintaining the same bearing as before.

Set the *target arm* and the *bearing arm* as before. Then move *own ship arm* until its

18-knot Speed Point is on the same *bearing line* as the 12-knot point of the *target arm*, but on the side *towards* the bearing. The Pointer End then is at 219, which course will keep us on the same true bearing of 000. (See Fig. 2.)

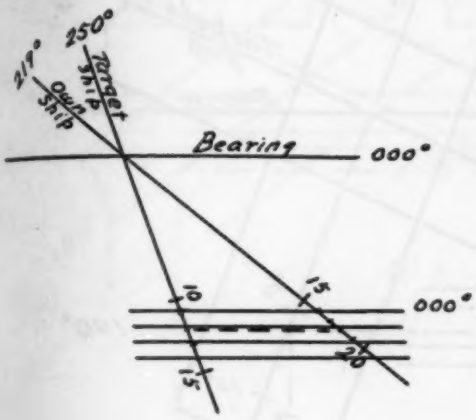


FIG. 2.

Note that in using the instrument for problems in opening distance, on diverging courses, it is merely necessary to set it as though *closing* from the *opposite* bearing. Or perhaps a more perfect picture of the problem if given by setting the reverse or Speed Ends of the *target* and *own ship arms* in the direction of the two courses, with the *bearing arm* on the side towards which we are going instead of the one from which we are coming. Both methods are illustrated in Fig. 4.

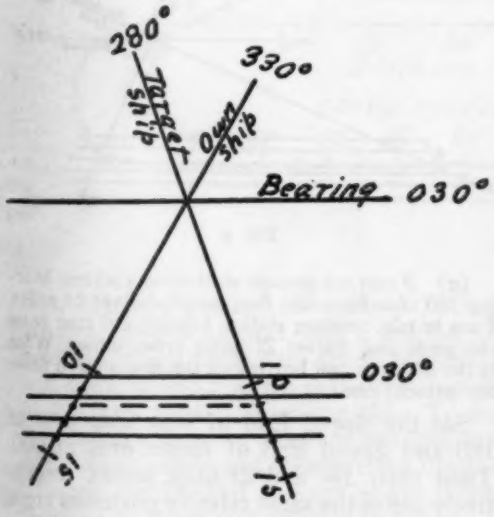


FIG. 3.

(c) The target ship bears 030, course 280, speed 11. (See Fig. 3.) I wish to join her on course 330, keeping her 60° on my starboard bow, but on the same true bearing of 030. What speed must I make?

Set *bearing arm* at 030 and *target arm* at 280 as before. Set *own ship arm* at 330, and pick out on it the Speed Point which lies on the same *bearing line* as 11 knots on the *target arm*. It will be about 12 knots, which will be the required collision speed.

(d) Target data is the same as in (c), but I wish to open out on course 255, keeping her 45° on my starboard quarter, but on the same true bearing. (See Fig. 4.) What speed must I make?

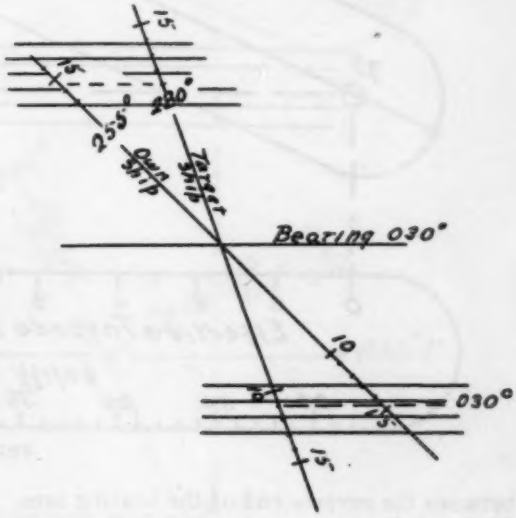


FIG. 4.

Set *target* and *bearing arms* as before. Set *own ship arm* at 255. Then pick out the Speed Point on it matching the 12-knot point on *target arm*, or about 14.5 knots.

(e) The target bearing is 100, target course 350, and speed 11; and I wish to hit her with a 25-knot torpedo. What are the torpedo track, sight angle, target angle, track angle, and maximum effective torpedo range? (See Fig. 5).

Set *target* and *bearing arm* at 350 and 100. Bring Torpedo Speed Point, 25, on *own ship* or *torpedo arm*, to match the *11-knot* point on the *target arm*. The pointer end then comes to 075.5 which is the direction of the required torpedo track, and if using curved fire ahead will be the correct firing course. The difference between the torpedo track, 075.5, and the target bearing, 100, is the sight angle, 24.5. The difference

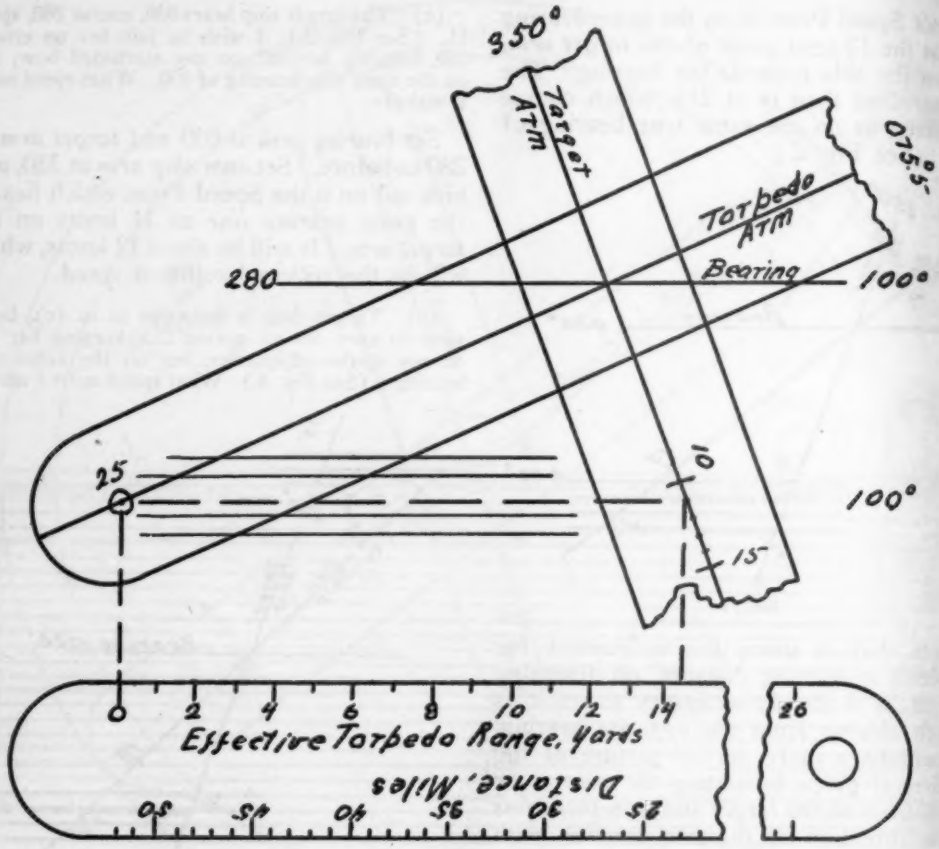


FIG. 5.

between the reverse end of the bearing arm, 280, and the target course, 350, is the target angle, 70° on the target's port bow. The difference between the target course, 350, and the torpedo track, 075.5, is the track angle, 85.5° on the target's port quarter.

To find the maximum effective torpedo range, merely measure the distance between the respective Speed Points involved, using the maximum torpedo range scale. (See Fig. 5.) In this case it comes to about 14,300 yards.

(f) The target data is the same as in (e), but I can choose my own bearing for firing, and wish to know which one will give me an exact 90° track angle.

Set *target arm* at 350, and *torpedo arm* 90° from it, or at 080 as shown in Fig. 6. Then move *bearing arm* until some *bearing line* passes through both the torpedo and target Speed Points, which will give a bearing of 103.5 on which to bring target before firing.

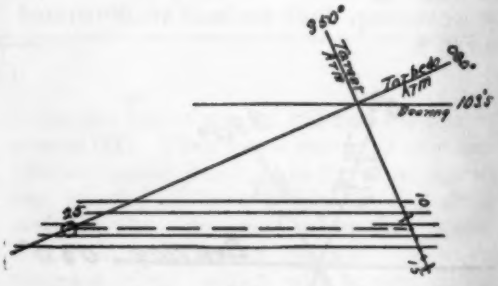


FIG. 6.

(g) From my present station on a screen, bearing 180 true from the fleet guide, distant 14 miles, I am to take another station bearing 060 true from the guide and distant 21 miles from same. What is the distance and bearing of the new station from my present one?

Set the Speed End of *own ship arm* at 180 and Speed End of *target arm* at 060. Then their 14- and 21-knot points respectively are in the same relative positions from the center, as the old and new stations are

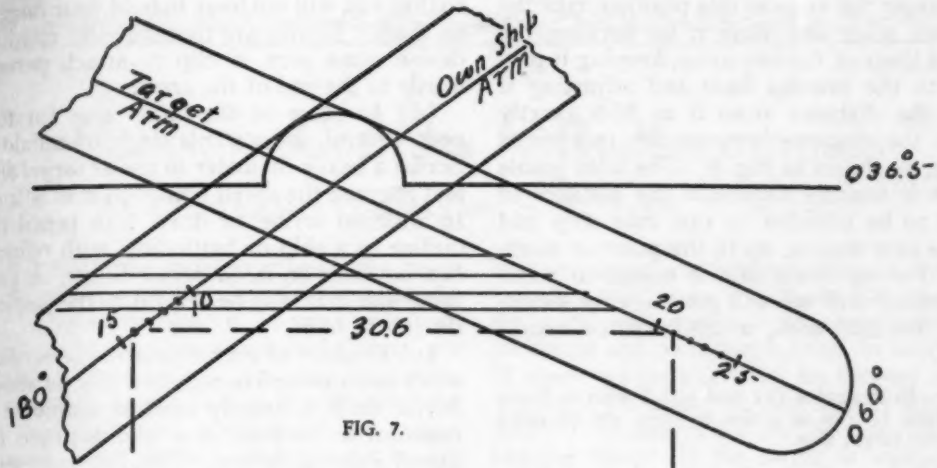


FIG. 7.

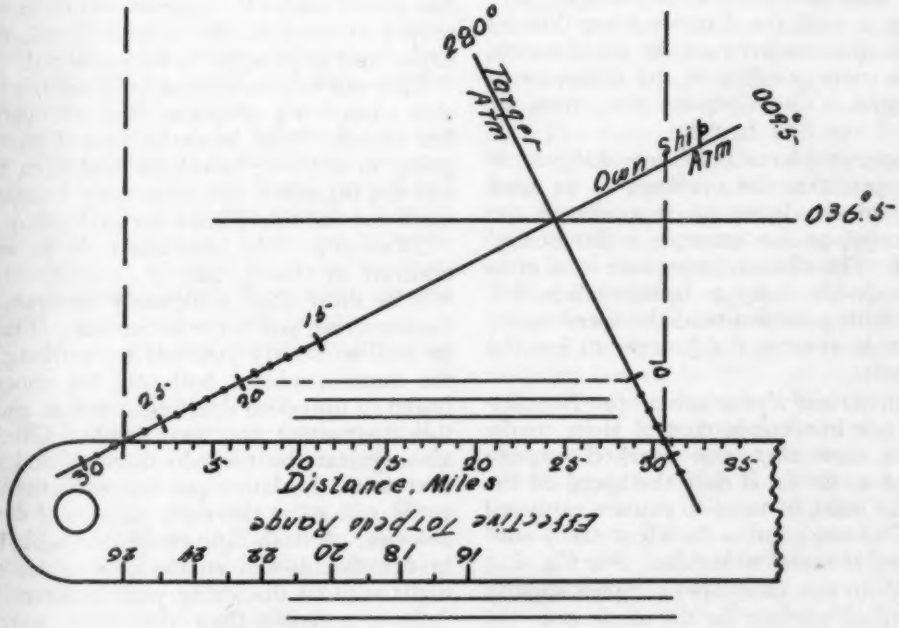


FIG. 8.

from the fleet guide. (See Fig. 7.) Shift the *bearing arm* around until a bearing line passes through these two speed points. It will come to 036.5 which is the true bearing of the new station from the old. To find the distance between the two stations, take the distance scale and measure the distance between the 14- and 21-knot Speed Points. It comes to about 30.6 miles in this case.

(h) In case (g) above, the guide's course is 280, speed 10; what course shall I steer to reach the new station at 20 knots; and for how long?

Proceed as in example (a), setting the *target arm* at 280, and the *bearing arm* at 036.5, and adjusting the *own ship arm* until its 20-knot point matches the 10-knot point on the *target arm*. The *own ship arm* now points to 009.5 which is the correct course.

Leaving the arms in this position, take the distance scale and move it up between the Speed Ends of the two arms, keeping it parallel to the *bearing lines* and adjusting it until the distance from 0 to 30.6 exactly spans the distance between the two speed scales, as shown in Fig. 8. The knot points which it touches represent the distance in miles to be traveled by our own ship and by the new station, up to the point of meeting. For our own ship it comes to about 27.5 miles, and we will get there by steaming 1 hr. 22.5 min., at 20 knots on course 009.5.

(i) In examples (b) and (d) I wish to know how long to run in order to open out 10 miles from the target ship.

With the arms set for the solution of the original problem, (Fig. 2 or 4), take the distance scale and use it as in example (h); adjusting it until the distance from 0 to 10 spans the distance between the speed scales, at points corresponding to the distances to be steamed. The distance may then be converted into time to run.

In these problems involving distance, it may happen that the numbers to be used are beyond the limits of 0 to 30 on the speed scales, as for example a distance of 40 miles. The obvious procedure is to multiply or divide it by a factor which will bring it within the limits of the speed scale; and then to reverse the process to get the final result.

Variations and Refinements. (a) For convenient use in torpedo control alone, make an extra *own ship arm* marked *torpedo arm,* and scribe on it only the speed of the particular mark of torpedo you are equipped with. The one point is then less easily confused and is easier to handle. See Fig. 5.

(b) With fine sandpaper roughen slightly the celluloid surface on the arms near the Speed Points; you can then mark with a pencil the Speed Points to be used on each arm in a particular case, and more easily identify and match them. Also, roughen similarly a space near the Pointer End of each arm. You can then use it to write down the target's known or assumed course, its bearing, and your own course, as memoranda if required. The pencil marks erase easily.

(c) Use ordinary wire paper clips to clamp the ends of the various arms in place, so that you will not have to hold your fingers on them. If you are mechanically minded, devise some sort of clip to attach permanently to the end of the arms.

(d) In place of the *target arm* for torpedo control, use a whole circle of celluloid. Scribe a heavy diameter to use as *target arm* and engrave the speed points on it as before. In addition scribe, or draw with pencil the outline of a ship or battle-line, with *relative bearing lines* on it, or *sector limits,* or anything else that may be helpful to the particular job in hand.

(e) In place of *own ship arm* (*or torpedo arm*) use a complete celluloid disc as above. Scribe on it a heavily marked diameter to function as *torpedo arm* and engrave the Speed Point as before. This line represents the torpedo track, and also the torpedo tube when curved fire is *not* used. Draw on the disc pencil marks to represent ship's head in proper relation to the torpedo track, tube angle, and gyro angle to be employed.

This will help considerably in handling the ship when firing otherwise than with curved fire ahead. Note, however, that if you are going to fire one broadside and then turn and fire the other, you must draw a separate mark for the ship's head for each salvo.

Summary. The instrument is perfectly accurate in theory, and if carefully made, will be more than sufficiently accurate for maneuvering and torpedo control. It might be well to satisfy yourself by working out the same problem both on the mooring board or universal drafting machine and on this instrument you have made. Check it also against the torpedo director and note that were the latter put out of action you could still solve the sight angle and fire by pelorus. A flash light, held low behind the bridge shield, will enable you to use it at night without disclosing your presence.

It is speedier than any other standard mechanism, even the universal drafting machine. Speed and accuracy require practice always, and it is recommended that after making your instrument, you compose and write down a series of problems with the answers, and spend a few minutes every now and then practicing them in your room.

You will soon be ready to use it with confidence in handling the ship; or at the very least, to annoy the navigator and torpedo officer by announcing the answer to problems with which they are still struggling!

Collision Courses *by* Radiocompass

By Lieutenant Commander H. K. Fenn, *U. S. Navy*

When the problem at sea is the interception of one vessel by another by radiocompass, it is not necessary to use those complicated methods which are ordinarily involved in tracking problems. The problem is not that of determining the course, speed, and position of the target prior to sight contact, but merely to set a collision course which must bring the searcher into sight contact with the target. It is true, of course, that the target can readily be intercepted after its course, speed, and position have been determined, but such determination is not necessary for the interception of the target.

In what follows it is assumed that the target is steaming on a steady course at a constant speed. The problem is considered as solved either when the searcher arrives within visual distance of the target, or when the searcher is brought to a course upon which the bearings of the target remain constant. Two methods will be given which differ only in the manner of their beginning.

First Method

In Fig. 1, the searcher of A takes a radiocompass bearing of the target and after steaming for any length of time, t, at speed, S, takes another bearing from B. True courses and bearings and all distances must be plotted carefully since the solution is entirely graphic.

If the target is drawing aft, the two bearings will converge, theoretically, to a point. But since the course and speed of the target can in no way be determined by these two bearings, it is necessary to make some initial assumptions upon which to proceed. There is little or nothing to indicate offhand what the course of the target may be, but a rough guess as to the limits of its speed may be possible considering the type of the target ship or the circumstances connected with the search. Only certain types of war vessels or fast liners would be likely to make 25 knots or more, and it is not likely that many vessels would make less than 10 knots. To fix limits to the speed of the target is to limit its course and its distance from the searcher. If, then, we consider that its slowest speed would be 10 knots, we may find T, where a line VT of length $10t$ will fit between the bearing lines. If the target is making 10 knots it cannot be nearer to the searcher than T.

Suppose that the identity of the target is known, and that the known maximum speed of the ship is 20 knots. With T as a center, and a radius equal to $20t$, we may strike an arc cutting the other bearing line at H and K. The lines HT and KT, then, are the limiting courses that the target can make if it is at T. In the absence of any better information we may commence operations upon these impromptu assumptions, relying upon later bearings to yield corrective data.

These limiting courses and speeds, together with the known bearing of the target from B, will enable us, by means of the mooring board, to find the corresponding collision courses between which to limit our choice of a new course from B. In the choice of the first new course it does not matter greatly which is chosen as long as the new course is between the limits obtained from the mooring board. On the principle that it will take longest to intercept a target that is headed away from the searcher it is well to take the course to intercept the target on its most unfavorable course, such as HT in Fig. 1. Such a course keeps the searcher in a favorable position to deal with other target positions without great delay.

Having chosen his new course, the searcher obtains another bearing at C. If this bearing is different from that taken at B, the difference will indicate whether the target is drawing ahead or drawing aft. If it is drawing ahead, the target must have been nearer to the searcher than T and must

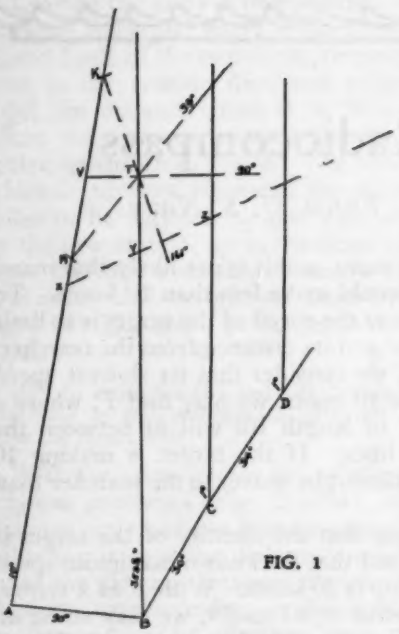


FIG. 1

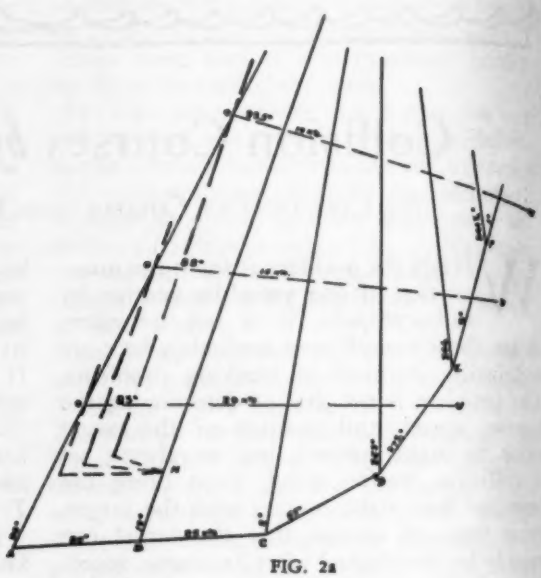


FIG. 2a

have been making a speed somewhere near its maximum. If it is drawing aft, its course and speed are not readily estimated at this time, but the change in bearing can be offset by applying a correction to the next collision course.

With the new bearing taken from *C*, consult the mooring board for the new collision course. Apply a correction equal to twice the difference between the bearings at *B* and *C*. This correction is applied in the same direction as the last change of bearing; that is, if the bearing of the target from *C* was to the right of the bearing from *B*, apply the correction to the right of the collision course calculated on the mooring board. This corrected collision course is the new course to be steered from *C*. The same process is repeated at each later bearing until the searcher is steadied on a course that gives no change of bearing.

The searcher need not hesitate to make radical changes of course for it is better to swing on either side of the real collision course than it is to allow the target to draw steadily ahead or aft. In all cases it is necessary for the searcher to study the plot and the changes of bearing in order to guide his selection of new courses to be steered. After a few bearings have been taken, an inspection of the bearing lines and their intercepts may enable the searcher to learn within narrow limits what the course and speed of the target actually are. With a little experience almost any problem of interception can be solved with six good bearings.

It will be noted that it is not necessary for the bearings to be taken at equal time intervals, nor is it necessary for the searcher to maintain a constant speed. But he must exercise care in providing the correct data for his mooring board calculations.

Second Method

In this method, three bearings are taken on the initial course. These three bearings enable the searcher, through the medium of the mooring board, to confine his initial assumptions of the target course and speed within narrower limits.

Since the mooring board treats primarily of relative motion, these first three bearings are laid off from the center of the diagram, *O* on Fig. 2.

Since these three lines diverge from one point, there is one system of parallel lines that can cross them with intercepts, either equal or of a given proportion. Let us suppose for a moment that these three initial bearings have been taken at equal intervals: then since the target, by hypothesis, is steam-

ing at constant course and speed, the direction of a line which cuts the three bearing lines with equal intercepts will be the *relative* course of the target. If the bearings are not taken at equal intervals of time then the line which cuts the bearings with intercepts proportional to the time intervals will be the relative course of the target. It is not necessary, except for simplicity, that these bearings shall be taken at equal time intervals; a geometrical construction will be given later by which the relative course of the target may be obtained for any time intervals between the three bearings.

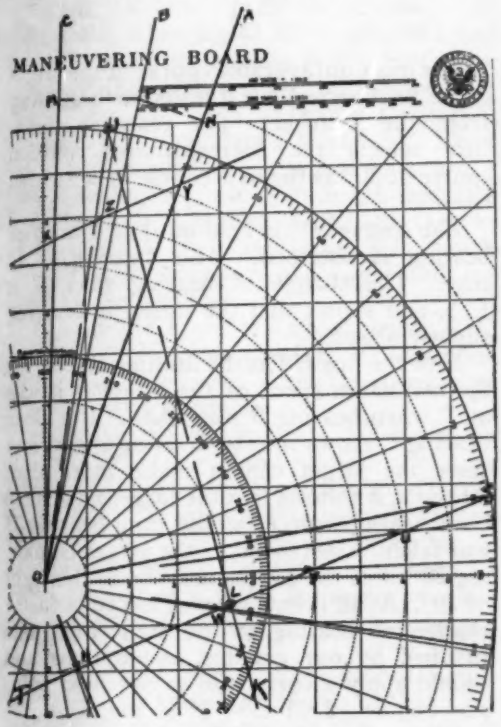


FIG. 2

In Fig. 2, XY is the relative course of the target, being the line that crosses the bearings OA, OB, and OC so that XZ equals YZ. Also, any line parallel to XY will have equal intercepts.

From the center of the board, lay off the speed vector of the searcher, OS, and from S draw ST parallel to XY. Then ST is the locus of the outer ends of the various possible speed vectors of the target drawn from O; that is, as long as ST is the relative course of the target, then the target must actually be on course OU, if its speed is 80 per cent of OS, or it must actually be on course OV, if its speed is 60 per cent of OS, or on OW if 40 per cent, etc. OH is the minimum speed that the target can possibly be making, since OH is drawn normal to ST.

In this way, each possible speed of the target is tied up with a particular course, and if we assume limitations of the target speed on the same basis as we did in the first method, we may readily find the corresponding limits of the target course and also the limiting collision courses. We may then proceed, point by point, as in the first method.

It will be noted that it is not necessary for the bearings to be taken at regular intervals. It is also unnecessary for the searcher to maintain a constant speed, except on the initial course ABC; but accurate data must be supplied for the mooring board calculations.

Constructive Problem

Given three lines which intersect in a point, to find the direction of a fourth line that will intersect the three lines with intercepts of a given proportion.

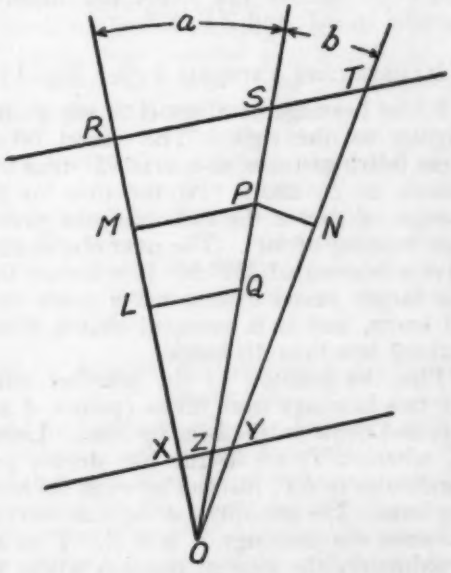


FIG. 3.

Suppose that RST cuts the three lines drawn from O so that $ST/RS = k$. The problem is, then, to construct a line parallel to RST without further mechanical reference to it.

In Fig. 3, $\frac{\sin a}{RS} = \frac{\sin ORT}{OS}$

and $\frac{\sin b}{ST} = \frac{\sin OTR}{OS}$

Dividing the first of these equations by the second,

$$\frac{\sin b}{\sin a} \cdot \frac{RS}{ST} = \frac{\sin OTR}{\sin ORT} = \frac{OR}{OT} = \frac{\sin b}{\sin a} \cdot k$$

From any point, P, on OS, drop perpendiculars PM and PN on OR and OT, respectively. Then,

$$\frac{\sin a}{\sin b} = \frac{PM}{PN} \text{ or } \frac{k \sin a}{\sin b} = \frac{PM.k}{PN}$$

Then, by (1) and (2), $\frac{OT}{OR} = \frac{PM.k}{PN}$

On OS, lay off $OQ = OP.k$ and from Q drop a perpendicular QL on OR. Then $QL = PM.k$

From O, lay off $OX = PN$ and $OY = QL$ and draw XY.

Then, by (3) and (4) $\frac{OT}{OR} = \frac{QL}{PN} = \frac{OY}{OX}$

But the conditions of (5) make $\triangle$s ORT and OXY similar $\triangle$s, hence XY must be Parallel to RT, and $ZY/XZ = k$.

ILLUSTRATIVE PROBLEM I (see Fig. 1)

Radio bearings of a vessel at sea change slightly to the right. The vessel taking these bearings turns to course 95° true and steams at 25 knots. At the time of the change of course the radiocompass gave a true bearing of 10°. The next observation gave a bearing of 359°.5. It is known that the target vessel cannot make more than 20 knots, and it is assumed that it is not making less than 10 knots.

Plot the position of the searcher when the two bearings were taken (points A and B), and draw in the bearing lines. Locate T, where VT, of length $10t$, drawn perpendicular to BT, just fits between the bearing lines. The quantity t is the time interval between the bearings A and B. T is approximately the nearest position where the target can be if it is making 10 knots.

From T as a center, with a radius equal to $20t$, draw an arc cutting the first bearing line at H and K. Draw HT and KT. For position T, HT and KT are the lines which limit the course of the target, since 20 knots is its maximum speed. With the protractor or compass rose we find that HT is course 39°, VT course 90°, and KT, 161°.

By the mooring board it is found that the collision courses are as follows for 25-knot speed of the searcher, and target bearing of 359°.5.

Target course	Target speed	Collision course
39	20	30
90	10	23½
161	20	16

The most unfavorable course of the target is the 39° course since it leads farthest away from the searcher. The searcher therefore selects the corresponding collision course of 30° as the new course to be steered from B.

The course 30° is held until at C another bearing is obtained. This bearing is 1° true. The change of bearing since B is 1°.5, and shows that the target is drawing slightly ahead.

Now the line HT is the limiting course for the maximum speed of the target if it was at T when bearing B was taken. But since bearing C shows it to be drawing ahead, and since the target cannot make more than 20 knots, it follows that the target must have been nearer than T, at the time bearing B was taken. Moreover, if the target is making 20 knots the course must be to the right of 39°. At all events we may expect a faster change of bearing to the right than was justified by our original assumptions and should apply a correction to our next collision course: $2 \times 1°.5 = 3°$ to the right.

With a new bearing of 1° true, and a target course and speed the same as before, the mooring board gives the new collision course 31°. Adding the correction, $31° + 3° = 34°$.

At C, the searcher therefore changes course to 34° and holds that course until at D another bearing is obtained. This bearing is also 1° which, being the same as the bearing at C, shows that 34° is the correct collision course. Further bearings should be taken, however, to maintain a check.

As bearings progress, it is possible to locate the target within quite narrow limits by laying a straightedge on the plot and moving it until the intercepts between the bearing lines are in proportion to the time intervals between the bearings. Unless the time intervals are equal, or nearly so, this operation is difficult, and frequently mis-

leading. In Fig. 1, the time intervals are equal, and the target is located on the line *XYZ*.

ILLUSTRATIVE PROBLEM II (See Figs. 2 and 2a.)

Suppose the searcher to be steering course 80° true, speed 25 knots. At 0600, at *A* (Fig. 2a) a bearing 20° is obtained. At 0700, at *B*, a bearing of 12° is obtained, and at 0800, at *C*, the bearing is 2° Plot these bearings *OA*, *OB*, and *OC* on the mooring board, Fig. 2. From any point *P*, on *OB*, drop the perpendiculars *PM* and *PN*. Since the bearings are taken at equal intervals, *k* equals unity, hence in Fig. 3, *QL* and *PM* are identical. On Fig. 2, lay off $OY = 5PM$ and $OX = 5PN$. Draw *XY*, which is the *relative* course of the target with respect to the searcher.

Lay off the searcher's speed vector, *OS*, course 80°, 25 knots equaling 100 divisions on the mooring board. Then the speed scale is 1 knot to 4 divisions.

Draw *ST* parallel to *XY*. *ST* is cut by the 80-unit, 60-unit, and 40-unit circles at points *U*, *V*, and *W*, respectively. Hence, if the target is making 20 knots, its course must be 83°; if it is making 15 knots, its course must be 88°; and if it is making 10 knots, its course is 99°. It cannot be making less than 5 knots, the vectorial length of *OH*.

The searcher should make a plot of actual bearings and tracks as shown in Fig. 2a, and should fit in the vectors *OU*, *OV*, and *OW* between the bearing lines as shown. To do this, lay off from any point *N*, on bearing *B*, the vectors *OU*, *OV*, and *OW* to the scale of the plot, and draw from the end of each vector a line parallel to *B*. Where these parallel lines cut the bearing *A* are the respective positions of the target for each course and speed, and the lines *OU*, *OV*, and *OW*, drawn from these points of intersection, are the tracks of the target corresponding to each vector. The searcher then knows where the target is if it is making 20, 15, or 10 knots, and could in like manner plot its track for any intermediate speed.

Cover the 20-knot, 83° course first. The collision course at *C*, assuming the target to be on that course and speed, is 55°, which course the searcher takes up immediately.

At 0900, the bearing from *D* is 353°. The searcher sees that he has not yet crossed *OU;* hence he consults the mooring board for a new collision course with that same target course and speed, but with the new bearing. A correction of twice the change of bearing is applied. The new collision course is 45°.5 and the correction is $2 \times 9° = 18°$ to the left. The new course from *D* is, then, $45.°5 - 18° = 27°.5$.

At 1000, the bearing from *E* is 346°. The searcher has now crossed the line *OU*, eliminating the 20-knot target speed, and therefore consults the mooring board for a collision course, assuming the target to be on course 88°, speed 15 knots. The usual correction is applied. The new course from E is then, 23°—14°=9°.

At 1100, the bearing from *F* is 344°.5. The searcher has now crossed the line *OV*, eliminating the 15-knot speed of the target, and therefore consults the mooring board for a collision course, assuming the target to be on course 99°, speed 10 knots, and applies the usual correction.

The new course from *F* is $6° - 5° = 1°$. The target would be sighted soon after the change of course at *F*, since it was actually on course 99°.5, speed 10 knots.

In this solution, the target vector *OU*, for 20 knots, was covered first simply as an illustrative difference from the procedure used in the first method. Starting with the vector farthest from the searcher usually gives the quicker solution, since the other vectors are crossed in doing so, and corrective data will be obtained as additional bearings are taken. Any other course of the target, between the limits given, could be assumed initially according to the choice of the searcher.

USE OF SECOND METHOD AS A MEANS OF TRACKING

As the bearings progress, and even before a collision course has been reached, the searcher will have gained considerable information of the target by the process of elimination. For example, when the searcher has reached *E*, Fig. 2a, he will have eliminated the possible target speeds of 20, 19, and 18 knots.

However, when the searcher is brought on a collision course and the target bearing is constant, there are complete data for the determination of the course and speed of the target and, hence, of its position. It will

be seen in Fig. 2a that at *E* the searcher changed course to 9° and that his next bearing changed only 2°, showing that 9° is quite close to the proper collision course. Let us assume for purposes of demonstration that 9° was the correct collision course, and that 346° is the constant bearing. In Fig. 2, we saw that *ST* was the locus of the outer ends of the target speed vectors as determined by the first three bearings. Then, in Fig. 2, plot *J* for the searcher course 9°, speed 25 knots, and from *J* draw *JK*, representing the constant bearing, 346°. Then *JK* is also the locus of the outer ends of the target speed vectors, and *L* where *ST* and *JK* intersect, must be the outer end of the actual target speed vector. If the vector *OL* is plotted on Fig. 2a in the same manner that *OU*, *OV*, and *OW* were, the actual track of the target will have been determined.

Even with the erroneous data assumed, Fig. 2 shows the target course to be 98°.5, speed 10.5 knots, which is not greatly in error for the actual solution—course 99°.5, speed 10 knots.

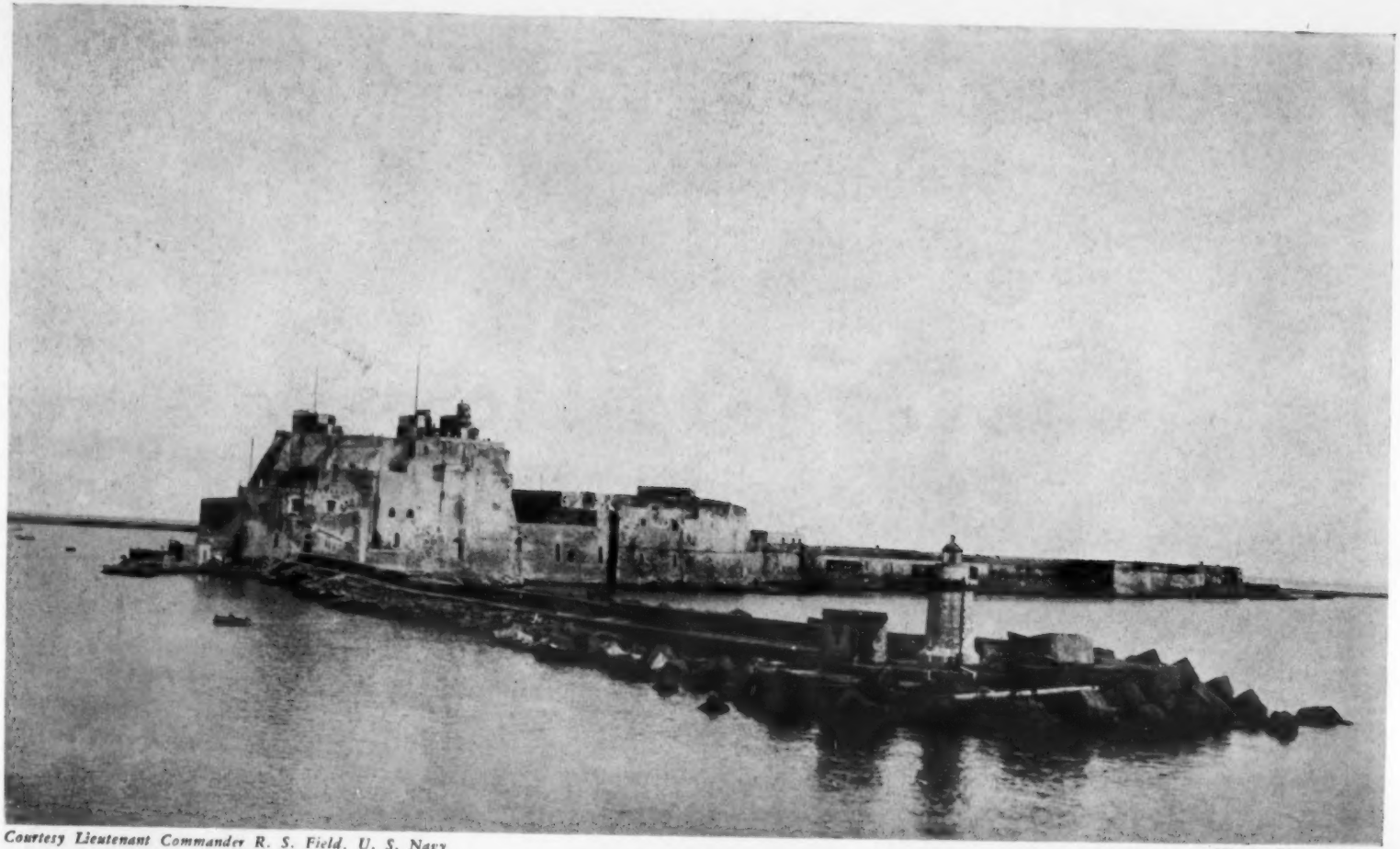
Still another method of tracking the target is suggested by the above. Suppose that after changing course at *C* and obtaining another bearing at *D*, the searcher is to continue the same course and speed, and obtain another bearing of the target at *E*. There will then be two sets of three bearings each, with bearing *C* common to both, and each of the two sets will have been taken while the searcher was on a constant course and speed.

We have seen that one set of bearings, *OA*, *OB*, and *OC* (Fig. 2) gives a locus line *ST*. The other set of bearings taken from points *C*, *D*, and *E*, could be used in exactly the same manner to determine another locus line. Then, the vector drawn from the center of the diagram, *O*, to the intersection of these two locus lines, would give the actual course and speed of the target, and the application of that vector, to scale, in Fig. 2a, would give the position of the target.

This latter method has the disadvantage of inaccuracy of plotting if the course from *C* is close to the collision course, because the bearings *C*, *D*, and *E*, will be so close together that the second relative course of the target will be difficult to determine graphically with accuracy. If, as is sometimes the case, tracking is desired rather than sight contact, course *CDE* could be selected approximately at right angles to the collision course. This would obviously increase the accuracy of plotting rather than making it more difficult.

Courtesy Lieutenant Commander R. S. Field, U. S. Navy

THE BEAUTIFUL VALLEY OF THE CETINAIN, DALMATIA
This was the seat of the Almissa pirates in Venetian days.



Courtesy Lieutenant Commander R. S. Field, U. S. Navy

W. O. Photo Brindisi

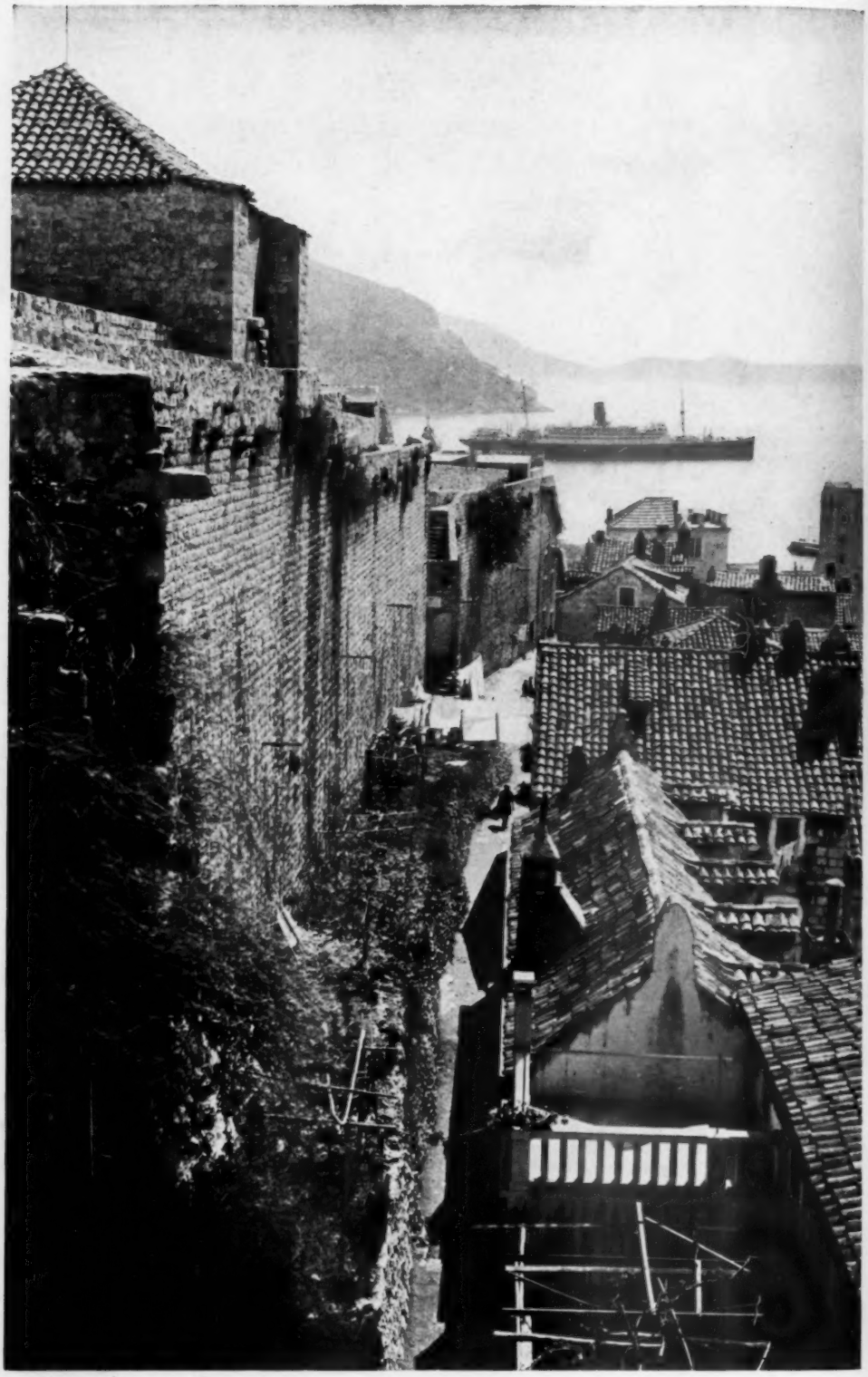
BREAKWATER AT BRINDISI

Courtesy Lieutenant Commander R. S. Field, U. S. Navy

CETINJE VALLEY, DALMATIA
This road was built by Napoleon.

Photo by Wayne

UNIV. OF MICH.



By Burton Holmes from Ewing Galloway

RAGUSA ON THE DALMATIAN COAST

Ragusa is famous for its medieval walls, its old houses, and quaint, narrow streets.

Elmendorf Photo (c) Ewing Galloway, New York

SIDE COURT, DIOCLETIAN'S PALACE, SPALATO, DALMATIA

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By Ewing Galloway, New York

PANORAMA OF RAGUSA FROM MOUNTAINS BEHIND THE CITY

PANORAMA OF RAGUSA FROM MOUNTAINS BEHIND THE CITY

Photo by Elmendorf (c) Ewing Galloway, New York

CATTARO, DALMATIA

The road leads to Cetinje over the mountains.

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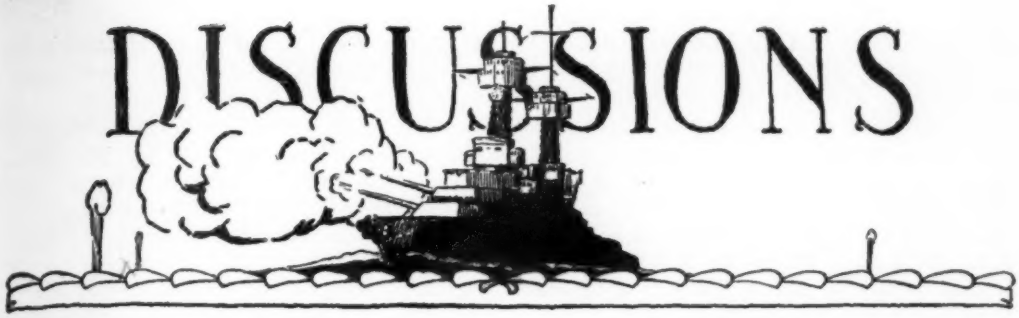
Photo by Elmendorf (c) Ewing Galloway, New York

CASTELNUOVO, A VILLAGE ON THE BOCCHE DI CATTARO, DALMATIA

DISCUSSIONS



CASTELNUOVO. A VILLAGE ON THE BOCCHE DI CATTARO, DALMATIA

The Cause of Battery Explosions

(See page 629, July, 1930, PROCEEDINGS)

LIEUTENANT W. J. HOLMES, *U. S. Navy.*—It is believed that the researches of Lieutenant Guthrie and the Naval Research Laboratory have made a valuable contribution to the knowledge of the cause of battery explosions. All submarine battery ventilation systems are designed to keep the hydrogen concentration well below the explosive mixture, even in the event that all the energy input to the battery, at the finishing rate of charge, is being consumed in disassociation of water. However, ventilation systems sometimes fail to operate and in such cases, at critical moments, the hydrogen percentage in the ventilation system may build up to the danger limit in an extremely short period of time. Any success in removing the second element necessary for an explosion, that is, the presence of a spark, will therefore materially reduce the hazard of battery explosions.

With the facts established under "summary" we are fully in accord and the method of investigation at Bellevue is undoubtedly free from errors. With the discussion of ground recording instruments on submarines, however, we do not agree. Also Lieutenant Guthrie's discussion of ventilation systems does not include the newer "V" type submarine systems. On some of these vessels the installation presents an entirely different problem in the measurement of grounds. To keep to the limits of the original article these vessels must be excluded from the present discussion.

It may seem beside the point to confine a discussion to a difference of opinion in method when we entirely agree as to conclusions. It is felt, however, that these researches will soon lead to new and more stringent regulations as to grounds on submarines, and in such an event we should examine closely everything that has to do with grounds and their measurements.

The peculiar construction and employment of a submarine presents the usual problem of grounds in an acute form. The majority of these occur on the lighting and power circuits due to sweating, oil, dirt, and moisture; and except for furnishing a return path, may be excluded from a discussion of battery grounds. They may not, however, be disregarded in measuring battery grounds unless special care is taken to prevent them from intruding.

The usual ground detector consists of a voltmeter, one side of which is grounded and the other side of which is connected through a selective switch to one leg of the circuit to be tested. The voltmeter usually has an internal resistance of about one hundred ohms per volt. Used in this manner the voltmeter becomes an instrument for measuring the resistance of a path to the ground and the reading of such a voltmeter is a function of the resistance of the voltmeter, the resistance of the path to the ground, and the voltage impressed. A full discussion of such a ground detector will be found in Bullard, Vol. I, page 503. It is evident that if one is fully acquainted with the voltmeter in use and the impressed voltage remains reasonably constant, we may speak of grounds in terms of volts. On a submarine and especially in battery work the voltage impressed cannot be regarded as a constant.

The first disturbing factor is the double voltage system, that is, the batteries may be either in series or in parallel. To illustrate my point: ground the forward battery positive, and observe the readings obtained with the circuit breakers in various positions.

The readings will vary in accordance with the condition of the battery as to charge or discharge but, assuming the battery to be idle, something like the following readings will be obtained:

Dead ground on forward battery positive

	F.B.	F.B.	A.B.	A.B.
Breakers out	Pos.	Neg.	Pos.	Neg.
Battery idle	120	0	0	0
Breakers in parallel				
Battery idle	120	0	120	0
Breakers in series				
Battery idle	120	0	240	—120

If the ground is on some intermediate cell of the battery, say on cell #30 entirely different readings will be obtained.

Dead ground on cell #30

	F.B.	F.B.	A.B.	A.B.
Breakers out	Pos.	Neg.	Pos.	Neg.
Battery idle	60	60	0	0
Breakers in parallel				
Battery idle	60	60	60	60
Breakers in series				
Battery idle	60	60	180	—60

To see why the ground detector behaves in this way it is only necessary to draw a sketch of the ground detector system and trace the circuits for each breaker position.

It is very evident that when we speak of grounds on a submarine in terms of volts we must agree as to the position of the circuit breakers. If we are dealing with battery grounds we are faced with another problem, for, of course, the source of E.M.F. is not concentrated and the ground may exist on any cell. Thus a ground of 10,000 ohms resistance on cell #60 (the end cell) will give a reading on the ground detector of sixty volts and zero volts on the forward battery positive and negative respectively, whereas the same ground on cell #30 (mid-cell) will give readings of thirty volts on both the positive and negative.

If more than one ground exists on the battery in question the prediction of the ground detector readings is not so simple. Without going into the details of the solution of this problem, although it presents a very nice exercise for one interested in the setting up and solution of simultaneous equations arising from the application of Kirchhoff's laws, it may be proved that for any number of parallel battery grounds:

$$R_g = \frac{R_v V}{d_p + d_n} - R_v$$

when

R_g = total resistance of path to the ground.

R_v = Resistance of the voltmeter in use.

d_p = Voltmeter deflection when measuring the ground to positive.

d_n = Voltmeter deflection when measuring the ground to negative.

With these preliminary considerations we may proceed to examine in detail Lieutenant Guthrie's arrangement for measuring the ventilation system ground. The first point to be brought out is that an electrical path must exist from the plates or bus bars of the adjacent cell to the voltmeter terminal in the rubber nipple in order for the voltmeter to register. In attempting to complete the other side of the circuit, however, we are immediately struck by the fact that the grounded side of the voltmeter is, electrically speaking, dangling in mid-air. To complete the circuit another ground must exist, either on another cell in the battery or on one of the circuits connected thereto, and the voltmeter deflection is as much a function of the resistance and position of this ground as it is of the resistance of the moisture path from the cell to the rubber nipple.

If the ungrounded lead is moved from one cell to another we will find the voltmeter deflection increasing or decreasing by increments of about two volts depending upon whether we are approaching or receding from the second ground. Finally if the connection is made to the grounded cell, or the cell to which the grounded circuit is connected, the reading will be zero. Indeed a grounded portable voltmeter is sometimes used at the individual cell switchboard to locate a grounded cell. If one side of a voltmeter is grounded and a lead taken from the other side to the various points on the cell switchboard the cell at which the voltmeter deflection is zero may be taken as the grounded cell, *provided that only one ground exists.* From this cell the voltmeter will give positive deflections if the lead is moved in one direction and negative if moved in the

other direction from the cell. It must be pointed out that with more than one ground the reversal and zero reading will take place at the electrical mean of the grounds and therefore more than one ground cannot be definitely located by this means.

Thus the voltmeter readings found by Lieutenant Guthrie's method may be almost without meaning. In attempting to eliminate the effect of grounds along the cell tops we have only emphasized these grounds or some other grounds on connected circuits.

The regular ship's ground detector is by far a better instrument for measuring the resistance of the acid film ground. Care must be taken, however, that any external circuits connected to the battery are free from grounds and the best plan is to have the battery under consideration entirely on open circuit while measuring the grounds. This will not eliminate the grounds over the tops and along the sides of the cells but with a reasonably clean battery, and no cracked jars, these grounds should be negligible, usually in the neighborhood of 200,000 to 400,000 ohms. In any event no method of measuring the grounds can eliminate from consideration any ground on the battery or the circuits connected thereto. They can only be eliminated by mathematical computation of the individual resistance or by their mechanical removal.

The choice of the term "ground" and the decision to use a grounded voltmeter for measurement is unfortunate. It immediately leads to conjecture that if we can keep the battery free from grounds we are out of danger. This is not the case. Consider the fact that cells #1 and #30 are immediately adjacent, with their ventilation leads coming into the same duct a short distance apart. A very short acid film therefore will form a short circuit between these cells and such a short circuit will have a voltage of from sixty to seventy-five volts impressed. There is no ground here and no deflection will be shown by any grounded voltmeter. It is admitted, however, that only a short film path is necessary to ground any of the end cells and that the full battery voltage may be impressed across this short path.

In "Experiment Five" it was stated that the voltmeter deflection could be used as an index of the current flowing in the acid film. This may be accepted for the experiments as conducted but it cannot be accepted when we move the problem aboard a submarine. If we have a ground of 10,000 ohms resistance on the end cell of a battery, the ground detector will show approximately sixty volts and if necessary return ground is on the other side of the line, the maximum current flowing will be 0.012 amperes. With the same voltmeter deflection of sixty volts, if the ground is on the mid-cell of the battery the resistance would be zero and any other ground would cause a theoretically infinite current to flow.

From the above considerations we conclude that no system of ground detector can give us a certain indication of the possible danger from sparking due to a current-carrying acid film in ventilation ducts. In view of this, the existing regulations in the *Bureau of Engineering Manual* concerning grounds are sufficient and adequate.

The article does not state what steps are under consideration for the elimination of the conditions described. Considerable experimenting has been done, however, as to the effect of increasing the number of baffles in the exhaust from the cells, with a view to preventing the carrying over of particles of electrolyte into the ventilation duct. These experiments give promise of some relief. If the moisture in the vent duct arrived there only by carrying over particles of electrolyte it would be possible to almost completely prevent the formation of the film by an efficient baffling system. It is very doubtful, however, that such is the case. During a charge the battery is almost always hotter than the compartment in which it is situated. Also during gassing the space over the electrolyte becomes a very efficient spray chamber. In passing through this space, therefore, the temperature of the air is raised and it becomes saturated with water vapor. Subsequently in passing through the ventilation system the temperature of the air drops below the dew point with consequent deposition of the moisture. Water may frequently be found dropping from the ventilating ducts and such water is usually found to be very low in acid content, showing that it has been deposited there by the processes of evaporation and condensation.

Now the problem of reducing the evaporation is bound up with the question of battery temperatures. Each pound of water so evaporated removes about 960 B.T.U.'s from the cell and reduction of evaporation

means increase of temperature. In many installations temperature is already too high for battery longevity. It would seem therefore that the most promising line of attack might be in the refrigeration of battery ventilation or the artificial cooling of the battery. Such systems are now found on some foreign submarines.

Naval Policy at the Crossroads

(See page 269, April, 1930, PROCEEDINGS)

LIEUTENANT COMMANDER L. DOUGHTY, JR., *U. S. Navy.*—It is surprising to find in the Naval Institute, and in the Prize Essay at that, a passage as follows:

> When the United States has been at war she has never stood for the complete freedom of the seas as defined by her at times when she was neutral. We recognized the effectiveness of sea power in the last war, after we entered it, by assisting in as strict a blockade as it was possible to enforce. Observe the Civil War and the curtailment of provisions and supplies that finally bore fruit in bringing Lee's half-starved army to terms. The blockade of Cuba was one of the first operations of the Spanish-American War. We remember the most drastic, effective blockade ever maintained with a great fleet, that of the British Navy in the World War. This blockade was later augmented by a squadron of American battleships.

This embarrassing fiction was first given to the world in 1923 in Hendrick's *Life and Letters of Walter H. Page,* Vol. II, page 266. It was at once seized upon by British apologists, both in England and America, and has been repeated so often, and with such apparent authority, that it has gained general credence, even among naval officers. It is, however, categorically untrue, and it seems pertinent to examine the basis of this charge. For a clear understanding of the matter it is necessary to go into some detail as to the nature of the blockade of Germany during the World War.

No blockade, in the commonly accepted sense of the word in international law, was ever established. Prior to the entrance of America into the war, the commercial isolation of Germany was achieved by England by two means:

(1) By conferring some of the legal rights of a blockading squadron to a squadron which was not blockading the enemy's coast and harbors.

(2) By a vast system of economic measures to prevent the entry of supplies into Germany, including restriction on exports, trade agreements, rationing of border neutrals, purchase of their surplus products, bunker control, black lists, angary, and requisition.

It was the economic pressure which effectively throttled Germany, but it must be borne in mind that these measures were only put into effect by the threat of naval pressure. The actual seizures made by the Tenth Cruiser Squadron were comparatively few, but the fact that Britain had the power to put the Orders in Council into effect, and would rigorously enforce them if necessary, induced the neutrals to accept the restrictions.

Now the significant point is that when we entered the war we coöperated with Britain in the economic measures, but not in the naval features of the blockade. There is not a single instance of any neutral cargo being seized at sea by the U. S. Navy during the war. The right of visit and search was exercised freely by us, in accordance with international law, but this activity was directed entirely at suspected enemy raiders. The only merchant vessel captured by the U. S. Navy was the gas schooner *Alexander Agassiz,* American owned, suspected of being outfitted as a German raider, which was captured by the U.S.S. *Vicksburg* off Mazatlan, Mexico, on March 17, 1918, and was later released by the U. S. Prize Court.

This exercise of economic pressure can in no way be confused with the question of the freedom of the seas. The legality of these measures was exhaustively debated and affirmed by the House of Representatives. The conclusion reached was that in war any government has the right to prevent the national resources from directly or indirectly assisting the enemy, which means in plain language that they can use their economic strength for driving special bargains.

What the United States had objected to prior to our entrance into the war, was not the exercise of these purely domestic rights by England but to the use of naval power to put them into effect. Since the U. S. Navy was not used for this purpose after we entered the war it is difficult to see how any accusation of inconsistency can be made. The mention of the American battleships which joined the Grand Fleet is simply meaningless. These ships had no possible connection with restrictions on neutral shipping.

It is true that we protested against the British Black Lists, which we later adopted when a belligerent, but the protest was based on comity rather than right, and the legality of the measure was not questioned. In any case this was a purely domestic matter and not related to the freedom of the seas.

Going back further into this question we come to the Spanish-American War. The United States exercised the usual belligerent rights of blockade, visit and search, etc., with scrupulous regard for international law, and I know of no altercations with neutrals over the exercise of these rights.

Coming to the Civil War, the United States established an effective blockade of the Confederate ports, in accordance with international law. The doctrine of continuous voyage was extended somewhat to prevent blockade running, but the legality of these measures was not questioned by the neutral governments.

The United States has been the traditional upholder of the rights of neutrals at sea in time of war, and on occasion it has gone to war for this principle. In all its wars this government has freely exercised the recognized rights of a belligerent in restricting neutral commerce, and when a neutral has not questioned the right of belligerents to do the same. On no occasion has this government violated, when a belligerent, the rules which it sought to impose upon others when itself a neutral.

Are We Raising a Frankenstein?

(See page 598, July, 1930, PROCEEDINGS)

LIEUTENANT COMMANDER E. TOPP, *U. S. Navy (Retired)*.—Italicized sentences such as "Millions for ships but not one cent to train officers" and "The government of the richest country in the world, having the second largest merchant marine, does not spend one single cent for the education of the men who will be put in charge of its merchant ships," should not be allowed to go unchallenged. Neither can we let pass the author's statement ". . . . that at the present day there does not exist any school run under Federal or State supervision where the future licensed marine officer, who is to be put in charge of the ships of our merchant marine, can obtain the proper scientific education to enable him to navigate these ships efficiently." Inconsistent with these alleged deplorabilities, Captain Jansen later admits of the existence and of the efficacy of two institutions in his statement, "The man trained in the New York or Pennsylvania state training ships is one of the best trained men we have in this country."

On June 20, 1874, Congress authorized the Secretary of the Navy to furnish upon application by the governor of a state, a suitable vessel with all of her equipment, charts, books, and instruments of navigation, for the use of state conducted nautical schools. A similar act was passed on March 4, 1911, designating the ports of Boston, New York, Philadelphia, Seattle, San Francisco, Baltimore, Detroit, Saginaw, Norfolk, and Corpus Christi, for sites for state controlled training schools. This act also authorized the detail of naval officers to act as instructors in the schools, and provided that a sum equal to that expended by the state but not to exceed $25,000 in any year be given to the states involved to assist in maintaining the schools.

Under the benefits of these acts the state of New York established its school in 1874; the state of Massachusetts in 1892; the state of Pennsylvania reëstablished her school in 1919, and the state of California is now engaged in the establishment of a school.

The current naval appropriation bill provides a sum of $100,000 to assist the four states mentioned above in the establishment and operation of their schools. However Navy aid does not end there. In addition to the money grant, the Navy also repairs the vessels loaned to the states at its own expense. A sum exceeding $90,000 is being spent on repairs to the Pennsylvania training ship *Annapolis*. Smaller, but substantial sums have been expended on the ships of the two other eastern states.

Nor is the Navy the only federal agency making a contribution towards training. The SS. *Henry County* has recently been transferred from the Shipping Board to the Navy, for further transfer to the state of California as a schoolship. Not satisfied with this generous contribution involving about $40,000, the Shipping Board also turned over much valuable surplus material to be used in outfitting the ship. This donation, plus the money spent, or to be spent by the Navy in the near future, will bring the total cost above $75,000 in addition to the annual federal grant of $25,000.

The state of Pennsylvania has appropriated $125,000 to run her school for the next two years, and the state of California has appropriated $115,000 for a similar period. In 1928 the state of New York spent more than $104,000 for schoolship purposes.

The author also states, "He" (a prospective merchant marine officer) "will soon realize that there are any number of public schools in the country which will teach him any trade under the sun, free of charge and with very little red tape involved, but not one single public school where he can take a course in navigation, nautical astronomy, or the other subjects which are essential to him in his future profession and a knowledge of which will enable him to pass the federal examination." Involving the whole country this statement covers too much territory for a complete list of schools giving such instruction. There is, in the author's own state at least one, the San Francisco Navigation School, operated for years under the expert guidance of Lieutenant Commander John MacMillan, U. S. Naval Reserve, a graduate of the U. S. Naval Academy. Its graduates are to be found in the Army, Navy, Naval Reserve, as well as in governmental and private aviation enterprises.

It seems not unfitting to mention that in June, 1930, a committee of representative shipping interests under the able leadership of U. S. Shipping Board Commissioner H. I. Cone, Rear Admiral, U. S. Navy (Retired) met in Washington, and began a thorough investigation and study on the subject of suitable training for future merchant marine officers.

Historic Cavite Navy Yard

(See page 811, September, 1930, PROCEEDINGS)

COMMANDER FRANK LUCKEL, *U. S. Navy.*—Lieutenant Cope's article upon "Historic Cavite Navy Yard" will undoubtedly be of immense interest to all who have seen service in the Philippine Islands. Inasmuch as the author states that "To get historical information . . . . one has to rely mostly on hearsay stories," and, in the hope that I might be able to contribute in some small measure to available information, the following comment is offered.

About two years ago while visiting an old Marine Corps warehouse or boat shed in the municipality of Cavite, I noticed and became interested in the old Santo Domingo church. Inquiring concerning its history, I was informed, in great detail, of a tunnel that ran from the church to the basement of the captain of the yard's quarters within the Cavite Navy Yard. The legend also referred to a second tunnel from Porta Vaga, which either connected with the first or ran independently, I have forgotten which. According to the story, which was verified in essential details by all the oldest Filipino inhabitants who were interviewed, these two tunnels were of large enough cross section to admit a "calesa" and were further reputed to contain considerable buried treasure. None of those interviewed had any first-hand knowledge or had actually seen any part or evidence of either tunnel.

This unanimous belief in the tunnels' existence, I found was not shared by several American foremen who had worked in the navy yard since the American occupation. They had all heard the story of the tunnels, but rather scouted their actual existence, and I was further informed that there was no apparent exit in the basement of the captain of the yard's quarters. I thereupon visited the old Santo Domingo church, the interior and grounds of which were used for the husbandry of pigs and chickens. The family owning the latter lived in a nipa shack in the church enclosure, and spoke fair Spanish and English. They had heard of and believed in the existence of the tunnels but had seen no evidence of any entry leading from the church or its enclosure. Accompanied by them, I searched for some trace of such a subterranean passage but could find none. I then continued these investigations at Porta Vaga and found no sign of any tunnel there either.

The structure of the grounds and floors was such that I believe that, had there been any tunnels, some evidence of the entrances would remain. Furthermore, while the stories usually contain some reference to cavings-in along the tunnel's route, there were no existing signs of these. Workmen who have made excavations in the vicinity of Cavite informed me that the soil there would make such extensive passageways quite likely to be indicated by subsidence or cave-in somewhere along their course.

According to the legend, these passageways were installed to permit underground

communication with Porta Vaga and Santo Domingo, during such times as Fort San Felipe might be under siege. While this sounds reasonable at first glance, nevertheless, the very layout of Fort San Felipe and Porta Vaga would seem to require that the defenders control the intervening territory. While hoping that someone can prove otherwise, all this appears to me to indicate that these old tunnels never existed, however much we might like to believe the old legend.

It might be of interest in connection with Lieutenant Cope's article to know that the old Spanish mint is reputed to have been located within the walls of San Felipe, which seems to indicate a very high opinion of its security. Relative to the recent building up of Sangley Point by marine action, it is interesting to know that jurisdiction over Sangley Point is not vested in naval authorities to the same extent as exists with regard to the Cavite Navy Yard. In fact, when for any reason it is desired to insure against the arrest by Philippine authorities of any personnel who might be attached to the Naval Hospital at Canacao, it has been deemed prudent to remove them to the limits of the navy yard proper. This appears to be a present day indication that when Fort Felipe was built there was no Sangley Point, and hence the imperfect jurisdiction in the case of the latter.

Admiral Sir Percy Scott and Gunnery of the British Navy

(See page 815, September, 1930, PROCEEDINGS)

REAR ADMIRAL BRADLEY A. FISKE, *U. S. Navy (Retired).*—In June, 1921, on pages 966 and 967 of Professional Notes the PROCEEDINGS published the following extract from *The Naval and Military Record* of March 30, 1921:

GUNNERY AND TORPEDO PLANING. Sir: As an American of English descent, a former member of the Naval Consulting Board, and a man interested from boyhood in navies and in everything pertaining to the sea, I have always been an intense admirer of the British Navy. I have been especially an admirer of the work of the late Lord Fisher—whom we regard as one of the great figures of naval history—in mechanizing British sea power, and of the strides made by the British Navy, under the leadership of Admiral Sir Percy Scott, R.N., in speed and accuracy of gunfire, since the latter's first memorable performance in H.M.S. *Scylla* in 1899, both in using individual naval telescope sights on gun mounts and with the director system.

As one of the pioneers of the aëronautical movement, and a governor of the Aëro Club of America for many years, I have been profoundly impressed by the British Navy's skillful development of the torpedo-plane since 1913; and I believe that great good will result from the controversy now going forward in your country and ours over the effect the torpedo will have on the capital ship.

But, while having the utmost respect for the superb performance of the British Navy, I cannot square with the spirit of fair play, for which the British officer is beloved the world over, the fact that British naval officers, in discussing their achievements in gunnery and torpedo planing have continually refrained from mentioning the truth that they owe the naval telescope sight, the director system, and the torpedo-plane to an American naval officer, the present Rear Admiral Bradley A. Fiske.

Admiral Fiske—then Lieutenant Fiske—took out the basic patents for the naval telescope sight and the director system in 1890. Both were described on page 506 of London *Engineering* on April 24, 1891, and in *La Revue d'Artillerie* on March 12, 1892, as well as in such newspapers as the New York *Times,* and many naval and scientific periodicals on many occasions. Furthermore, the fact was later published broadcast, that on September 22, 1892, on board the U.S.S. *Yorktown,* in Bering Sea, Lieutenant Fiske, using his telescope sight, made a record at target practice with a 6-inch gun that was wholly unprecedented. This subject was elucidated at great length by Lieutenant Fiske in an article that was published in the U. S. NAVAL INSTITUTE PROCEEDINGS in June, 1896.

Moreover, it was perfectly well known by all the navies that the U. S. Navy adopted the telescope sight shortly after Lieutenant Fiske's demonstration in 1892, and that it was used in the U.S.S. *Olympia* at the battle of Manila Bay on May 1, 1898, and in all the American battleships at the battle of Santiago on July 3, 1898. Still, the British Navy date the improvement of modern naval gunnery from the performance of H.M.S. *Scylla,* in 1899, and attribute the invention of the naval telescope sight and the director system to Sir Percy Scott.

I cannot but find the British Navy similarly remiss in regard to the torpedo-plane, for the torpedo-plane was patented by Admiral Fiske on July 16, 1912; and the fact was widely published, and with full illustrations and description, during the remaining months of 1912 and the early part of 1913. The British and Italians began experiments with it in 1913. In 1915 certain Turkish craft—I think four—were sunk by a British torpedo-plane in the Sea of Marmora, and in 1917, I believe, the Germans sank two British steamers in the North Sea. Since then, all the great navies have been at work developing it; but apparently they have not only followed the general plan described in Fiske's original patent, but have adhered almost exactly to the mechanical apparatus described in his patent, even to its details. Nevertheless, Mr. Bywater, in your issue of February 16, 1921, refers to Fiske merely as the first to advocate air torpedo work in the United States.

All of the facts that I narrate can easily be verified by reference to the United States Patent Office, and to leading newspapers and other periodicals printed in the English, French, German, Spanish, Russian, and Japanese languages, and to Fiske's autobiography, which has been on sale in England for more than a year.

Surely, it cannot be the intention of the British Navy to claim credit it does not deserve, nor to withhold from a distinguished officer in a sister navy the credit to which he is entitled for useful achievement.

In closing, please permit me to express my appreciation of the fairness and good feeling which you invariably display in treating American subjects. Your attitude has won you the confidence and respect of your American readers. Respectfully, HENRY A. WISE WOOD.

In the same issue of the PROCEEDINGS appeared the following from the *Naval and Military Record* of April 20, 1921:

WHO INVENTED TORPEDO-PLANES? We published in our issue of March 30 a letter from Mr. Henry A. Wise Wood, of New York, who entered a courteous protest against the presumption, general on this side, that the naval telescope sight, the director system, and the torpedo-plane were British inventions, when the fact is, he declared, that we owe all these things to an American naval officer, the present Rear Admiral Bradley A. Fiske. We forwarded Mr. Wood's letter to Admiral Sir Percy Scott, and invited him to comment upon it, but, being at present away from his books of reference, he has been unable to favor us with a detailed reply. However, he informs us that when he was commander of the *Edinburgh* in (he thinks) 1897, telescope sights had been in use on turrets for some time, but "possibly Admiral Fiske was the inventor." We believe that Admiral Fiske was, in fact, first in the field with this device, which made accurate shooting possible at long range and certainly the evidence which Mr. Wood adduces on his head seems overwhelming.

We have also read that Admiral Fiske evolved an effective system of director firing many years ago, but we do not know whether this system was fundamentally the same as that which Sir Percy Scott perfected, or whether its introduction into the United States Navy antedated the adoption of the Scott director by the British Navy. As regards torpedo-planing, we are aware that Admiral Fiske has been for some years a strong advocate of this weapon, and we accept Mr. Wood's statement that the admiral was the pioneer of air torpedo tactics. So far as we are concerned, the last thing we desire is "to withhold from a distinguished officer in a sister navy the credit to which he is entitled for useful achievement." Admiral Fiske, we would add, is widely known and esteemed in British naval circles both as a sea officer of the very best type and as a man of brilliant inventive genius. We remember him, also, as having publicly defended the policy of the British Admiralty towards the *U*-boats menace at a time when that policy was being subjected to criticism by other American officers who were not conversant with the peculiar conditions of warfare in the North Sea.

I patented what is now called the "Director System" in many countries in 1890. My U. S. patent is dated September 9, 1890, and is called a "Method of Pointing Guns at Sea." Its solitary claim reads:

> The method of pointing a gun located on a rolling, heeling or vibrating platform, which consists in adjusting a telescope, also located on said platform, and movable on a transverse axis, approximately parallel to that of the gun, at an angle to the axis of the bore of said gun equal to a certain predetermined angle of elevation necessary to cause the projectile fired from said gun to travel to a given target, and, second, noting the moment when the line of sight of said adjusted telescope is caused by the movement of said supporting platform to intersect said target.

The drawing of said patent showed the telescope wholly unattached to any gun. Furthermore, one of the sentences in the specification reads "It places the determination of the instant of firing the gun in the control of a person distant therefrom, and hence in a position away from the excitement and hurry prevailing in the immediate vicinity of the gun."

Because of the fact that ships were not so constructed then that the guns would traverse in parallel planes, I found it impossible to adapt this method practically to any existing ship; and so I restricted my activities at first to the simplest case, that of one gun with the telescope attached to it; the existing patent covering that use of a telescope also, because the exact position or mounting of the telescope was immaterial, so far as the basic method was concerned. My first patent on a "Telescopic sight for ship's guns" was applied for on March 9, 1891, and granted on September 5, 1893.

It would be in very bad taste to endeavor to detract, in even the smallest measure, from the honor due to Admiral Sir Percy Scott for his inestimable services to naval gunnery, and therefore to the national defense of every civilized state. And it would be thoroughly discreditable to belittle the magnificent British Navy, on which our own Navy was originally patterned. But nevertheless, in the interests of truthful history, there can be nothing wrongful, in these days "when all things are forgotten" so very quickly, in reminding ourselves that for certain appliances which she regards as of inestimable value, the British Navy is indebted, wholly and incontestably, to the United States Navy.

PROFESSIONAL NOTES

AUGUST 1 TO SEPTEMBER 30

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AND
PROFESSOR HENRY BLUESTONE, U. S. NAVAL ACADEMY

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UNITED STATES

Maintaining the Navy

Washington *Post,* August 22.—Now that the naval treaty has been ratified by the United States Senate the excitement over this important document has died down, so to speak. It will be aroused again, however, in the next session of Congress when the appropriations necessary to put the terms of the treaty into effect come up for consideration. The country may then expect another outburst of pacifist piffle, a shouting of the little navy forces to the effect that now that we have achieved naval limitation, and in effect, parity with Great Britain, we do not want such parity. They will assert that the "moral victory" achieved by the treaty is sufficient. The average commonsense American, however, is unable to see where moral platitudes will do us a great deal of good if we are confronted by an enemy who is determined to cripple or destroy our country.

Most thinking Americans will agree with Admiral Hepburn, who declared recently that the treaty would be worse than nothing if we failed to build up to the parity which is a fundamental part of our program and of our national defense. The great danger is not in the treaty but in the chance that we will fail to live up to the treaty by building the number of warships which the treaty allows us. It has been well pointed out that some of the alleged "peace organizations" which implored the Senate to ratify the treaty would, at the earliest possible opportunity, bombard Congress with petitions to prevent the attainment of the parity which the treaty undertook to guarantee. The old argument that because the powers have made renunciation of war, there is no reason why the United States should take advantage of the treaty's terms is certain to be a strong feature of the new propaganda against naval construction by the United States; and with this, of course, there will be tied up the altogether specious plea that such construction will constitute an awful waste of money.

The assault against the terms of the treaty by the pacifists will come when the plans of our naval officers for replacement and new construction are presented to Congress for consideration. These plans call for the expenditure of approximately $200,000,000 a year for the next five years on our Navy. This looks like a sizable sum, but it is to be remembered that half of it is for replacements which would have had to be made whether there had been any naval treaty or not. Therefore, the sum for new construction is only about $100,000,000 a year. This is considerably less than a dollar apiece for all Americans and naval security is certainly worth that much to each and every one of us. Besides, the expenditure of this money will bring employment to many thousands of Americans at a time when an increase in our employment is badly needed.

To those who profess to be appalled at the figures it may be answered so much needed construction is due to the fact that after the Washington naval limitations treaty we permitted our naval construction to languish because we had faith in the sincerity of our naval competitors that they wanted to cut down naval construction. As a result, during the nine years, we were spending about $48,000,000 a year on Uncle Sam's Navy, but laid down or appropriated for only eleven naval craft. During the same years Japan laid down or appropriated for 125; France, 119; Italy, 82; Great Britain, 74. So much for the good and pacific intentions of our naval rivals.

Surely these figures and the results of the Washington conference of nine years ago are sufficient proof that we ought to build up to the treaty requirements this time. But there are difficulties in the way. The pacifist pifflists who supported the treaty will now want to scuttle it by failing to live up to its provisions. It is up to real Americans to see that such a shattering of our naval defense is not permitted.

Latest Aircraft Defense Weapons Shown by Army

Washington *Star,* September 12.—Uncle Sam gave the public a sample of the sort of welcome that awaits any winged would-be invader of the United States at the Aberdeen, Maryland, proving grounds yesterday.

Their muzzles pointed high in the air, the best guns that have been developed for repelling the air invader sent fusillade after fusillade of solid and explosive shells into the sky at little sausage-like targets towed as high as four miles in the heavens, and when the targets came down they presented a sad picture of what an air invader would resemble had he been so rash as to fool

with the antiaircraft defenses of the United States.

It was all in play yesterday—that's why the biggest guns of the Army were silenced for about an hour while observers along Chesapeake Bay shooed out of range a harmless party of fishermen who had selected a spot for their sport just below where the Army gunmen were planning to explode several hundred pounds of explosive shells.

But the play was in deadly earnest so far as the "sleeve" targets, towed by airplanes were concerned; as the tattered remnants of those targets, floating down, fully attested.

The shooting yesterday, for public edification, culminated nearly a month of secret testing of various forms of antiaircraft weapons, and opens the way for more tests that are to continue the secret, until November 15.

Thorough exhibitions of the manner in which an air invader would be dealt with by the coast defenses in time of war, both in day and night warfare, were given by the forces of the Coast Artillery, the Ordnance Department, the Corps of Engineers and the Air Corps.

Yesterday morning the 30-foot red "sleeve" targets, barely visible to the naked eye thousands of feet in the air, were the objects of attack by guns ranging from the new big machine guns shooting half-inch slugs of copper and steel and requiring only one man to operate them to the big 105-millimeter guns with gun crews of nearly a dozen men.

Last night it was at white "sleeves" the Army shot at, brought into the range of the naked eye easily by 800,000,000-candlepower searchlights which cut ribbons of daylight high into the velvety-black sky.

The same program of firing was used in both the day and night tests.

The first guns shot were two .50-caliber machine guns capable of firing 500 slugs a minute apiece, mounted together and operated by one gunner in a turret mounted on a fast truck. This weapon is one of the most mobile units of the antiaircraft development and can pour a veritable hail of metal into the path of a fighting or bombing plane. The gunner fires with the aid of a stereoscopic sight, developed from the old stereoscope which in the "gay nineties" was a part of the paraphernalia of every parlor, used to give depth to the pictures depicted on post cards.

These stereoscopic sights are among the newest developments of antiaircraft warfare. The human vision, experts explain, is not capable of retaining the all-important depth in sight for the distances required to fire the big machine guns, so the stereoscopic sight is supplied to round out the picture of the target for the gunner.

Tracer bullets every fifth shot in the ammunition belt provided spectators yesterday with means of telling just how well the gunner was faring with his target. The gunner, in his small turret, operated the firing mechanism of his two guns with his feet, turning for direction with one hand and raising or depressing the gun muzzle with the other.

The next demonstration was with a four-gun battery of these .50-caliber machine guns, which, operated separately, poured 2,000 slugs a minute at the fluttering target.

Then the big guns were put in action, a four-gun battery of mobile 3-inch antiaircraft guns, capable of firing twenty-five shells apiece every minute.

Their muzzles pointed high in the air at the nearly invisible target at the end of a 2,000-foot towline behind an airplane, they sent explosive shells screaming high into the sky, the bursts of the shells leaving little white patches of smoke silhouetted against the dark target to show when the shells hit. The 3-inch gun battery in action sets up a continual and almost deafening roar as it fills the sky with rapid-bursting shrapnel and high-explosive shells.

The final show was given with the big 105-millimeter guns, set in permanent mounts and capable of propelling shells as high as 40,000 feet into the air, at the rate of about fifteen shells a minute per gun. A two-gun battery was trained on the target and the biggest antiaircraft shells now in use were sent whining away into the sky at the target. Bursts of these shells showed to the visitors at the proving grounds yesterday and last night, some fine markmanship on the part of the gun crews handling the big guns.

On exhibition, but not fired in yesterday's exhibition, is the newest gun received at Aberdeen, a 37-millimeter machine gun, which is capable of firing 100 explosive

shells, weighing about a pound and a quarter, every minute, with a range of better than four miles. The shells for this gun are equipped with a highly sensitive explosive cap, designed to explode the projectile on impact with any part of a plane.

On exhibition also was a varied array of devices used in spotting the target and directing the fire of the big guns. There were cinematic spotting instruments, which, for purposes of research give experimenters with the big guns accurate and detailed records of each shell fired on a motion picture film.

The "brains" of the 3-inch gun battery is the fire director, a small box, mounted on a truck, which is able to move with the guns and which performs mechanically the varied jobs of mathematics necessary to the fire direction. With this director are several aids, one a height-finding instrument, which, trained on the target, computes the height of the object to be fired at through mechanical calculation and tells the gun crew the direction of the target and the angle at which it is to be fired.

Submarine Policy

Naval and Military Record, August 6.—Officials of the Navy Department indicated today that the building of large fleet submarines, such as the present V class, which displace between 2,500 and 3,000 tons, are armed with a 5-inch gun, and can make the double journey across the Atlantic, without refueling, may be abandoned by the United States in favor of smaller vessels, chiefly valuable for coast defences.

One of the most difficult problems now confronting the General Board of the United States Navy is how best to use the 52,700 tons of submarines allotted to the United States under the London Limitation Treaty. The Board is now working out a comprehensive building program for submission to Congress in December.

The consensus of opinion among naval officers seems to be that, despite the admitted need for large submarines able to accompany the fleet at sea, it would be unwise to use all the tonnage allotted to the United States on this type, and it is generally felt that there is greater need for more submarines of the smaller type to guard the long coast line of the country.—REUTER.

Navy May Train Officers for American Merchant Marine

Marine Journal, September 1.—In our issue of June 15 a summary of the able suggestion of Bion B. Libby, submitted before the Third National Conference on the Merchant Marine was published. This created wide discussion in shipping circles.

We are glad to note that the Hon. Ernest Lee Jahncke, Assistant Secretary of the

Vessels Under Construction, United States Navy—Progress as of August 31, 1930

Type Number and Name	Contractor	Per cent of Completion				Contract date of completion	Probable date of completion
		September 1, 1930		August 1, 1930			
		Total	On ship	Total	On ship		
LIGHT CRUISERS							
Louisville (CL28)	Puget Sound Navy Yard	93.	91.9	90.7	89.4	3/13/31	3/13/31
Chicago (CL29)	Mare Island Navy Yard	91.1	86.7	88.5	83.4	3/13/31	3/13/31
Augusta (CL31)	Newport News S. B. & D. D. Co.	86.3	86.2	83.5	83.4	3/13/31	3/13/31
New Orleans (CL32)	New York Navy Yard	2.9	1.2	2.9	1.2	6/ 2/33	6/ 2/33
Portland (CL33)	Bethelehem S. B. Corp. (Fore River)	23.8	13.3	21.5	12.	8/15/32	8/15/32
Astoria (CL34)	Puget Sound Navy Yard					10/ 2/33	10/ 2/33
Indianapolis (CL35)	New York Shipbuilding Co.	23.6	17.3	21.5	12.2	8/15/32	8/15/32
Minneapolis (CL36)	Philadelphia Navy Yard					3/ 2/34	3/ 2/34
FLEET SUBMARINES							
V-6 (SC2)	Mare Island Navy Yard Comm.					7/ 1/30	
V-7 (SC3)	Portsmouth Navy Yard	13.4	13.	9.4	8.7	8/ 1/32	8/ 1/32

Authorized by Act of August 29, 1916.
12 Destroyers Nos. 348 to 359 inclusive—no funds for construction.
1 Transport No. 2—no funds for construction.
2 Fleet Submarines Nos. 170 and 171.
1 Neff Submarine No. 108—no funds for construction.

Authorized by Act of February 13, 1929.
10 Light Cruisers.
1 Aircraft Carrier.

Navy, has endorsed the plan as outlined by Mr. Libby substantially in detail.

Mr. Libby's idea was that Congress should increase the appropriation for the Naval Academy to permit appointment of five cadets instead of four from each Congressional district and by appointment of senators. This plan would add 550 additional cadets, so that the only new expense that would be assumed by the Government would be an appropriation to cover the pay and subsistence of the additional cadets, which, he estimated, would not much exceed $500,000.

The Naval Academy now has the plant, vessels, and organized teaching staff, and the entrance requirements are the same as those prescribed by the universities and technical schools. The physical examination is rigid, and there is a four-year course instead of two as on the three schoolships now in service.

The Naval Academy course is considered the equal of any technical school in the country, and the result would be, according to Mr. Libby, that after a four-year period there would be a surplus in each graduating class of about 150 men available for the merchant service, which would form the nucleus for the best educated and best physically developed class of merchant marine officers in the world.

While endorsing this plan, Mr. Jahncke made it plain that it was not as yet part of the Navy program, but he indicated that the Navy Department, the Department of Commerce, and the shipping interests will be likely to urge its adoption. Mr. Jahncke said:

> These young men would be selected Americans just as they are now. Each would be thoroughly trained, as those in the Naval Academy are trained, but only the number needed by the peace-time navy would be kept for active duty upon graduation. Those not commissioned for active duty would be commissioned in the Naval Reserve, and would take their places in the merchant sea service and in civil life—sturdy young men trained to do useful work and available for the country's defense in the time of need.
>
> I can anticipate some of your thoughts: You say that naval training does not fit a man for the merchant sea service or for civil life. That is just an application of the old misconception that army training does not fit a man for business. Just the other day one of our greatest statesmen-diplomats, who is charged with a great undertaking at the present time, asked the Navy Department for a detail of officers to aid his project, and very frankly said he was scanning the American military services for trained men to be his executives.
>
> Navy training teaches a young man to take into consideration every conceivable factor that enters into every imaginable problem that may face him. It produces wholesome, clearminded, alert, and capable young men who are better able to work out the average man's life problems than are most young men you find who have not had its advantages. Navy training is thorough in fundamentals. Equipped with the training, such as is given at Annapolis, a young American can start, with a most favorable handicap, as a banker, a builder, a manufacturer, a merchant, a broker, a farmer, an industrial executive, or most any other occupation now found in our complex civilization.
>
> With the enactment by Congress of favorable shipping laws, award of mail contracts, and lending financial aid by the Federal Government to shipping interests, there has been considerable expansion in merchant marine activities with an increasing need for competent personnel to man the vessels. There are three state nautical ships maintaind by Massachusetts, New York, and Pennsylvania, but these do not turn out enough graduates to fill the officer vacancies on the ships and are open only to citizens of these respective states.
>
> With the present authorized strength of the officer personnel of the Navy, the Naval Academy maintains on an average about 1,000 midshipmen. There are adequate living quarters now available for more. There could then be from 150 to 160 graduates in excess of the Navy's need available for the Merchant Marine. The curriculum at the Naval Academy would not be changed, but it might be desirable to have a short postgraduate course of instruction for those graduates who desire to enter the merchant sea service. If the excess graduates did not, they would be a distinct asset to the country as civilians.
>
> A ship of today is a very complicated structure, and it is necessary that her officers have technical knowledge of her and her equipment as well as seagoing experience. With the Naval Academy already built and in operation it seems the logical place to give the education. It's the Navy's job and responsibility. Further, I believe our merchant marine officers should come from all parts of the country, so that a feeling will be created throughout the land that our shipping is of a national character.
>
> With the congressman making the appointments the whole country would be represented. The Navy is interested in this subject because an efficient and well-manned merchant marine is necessary and essential to the national defense.
>
> To successfully operate the Navy in the event of a national emergency the logical place to obtain officers to augment the peace-time operating personnel is the merchant sea service.

GREAT BRITAIN

A New Machine Gun

London *Times*, August 6.—Captain L. With-Seidelin, of the Danish Army, gave a demonstration with the Madsen gun on the

Century Range today, before an assembly of services officers which included Major General F. F. Ready (commanding 1st Division), Major General T. A. Cubitt (commanding 2nd Division), Brigadier J. Blakiston Houston (commanding 2nd Cavalry Brigade), Colonel W. W. Godfrey, R.M., and Commander G. D. Taylor, R.N. Similar demonstrations have been given previously to General Sir Philip Chetwode (C.G.S., Army in India), General Sir Charles Harington (G.O.C.-in-C. Western Command, India), and other officers of the Indian Army.

It was claimed by the demonstrator that the Madsen gun possessed all the good points of the Lewis and Vickers guns and none of the defects of either; and that by superseding both it would do away with the anomaly of two distinct types of weapon being employed for operations which should be carried out by one and the same weapon, possessing the mobility of the Lewis and the fire power of the Vickers.

In the course of the demonstrations, which occupied several hours, some 13,000 rounds of service ammunition were fired. Of that number, 9,600 were fired from a single gun in a steady stream, broken only by the operation of fixing a new magazine after every thirty rounds and of changing the barrel when the one in the stock became overheated. Only two barrels were used in this test, and cooling was obtained by thrusting the dismounted barrel into a trough of water.

The gun was fired from a two-legged rest, from a tripod, and from the shoulder in erect, kneeling, and prone positions. It was fired in single shots, short bursts of four or five rounds, and long bursts of thirty. Horizontal traversing and vertical searching were practised on targets scribed in squares. In traversing 180 rounds were fired, and the target showed that the shots were all within a belt about fourteen inches wide. In the vertical tests the dispersion was rather wider. By an ingenious mechanical device attached to a Bowden cable the gun was fired from a parapet which hid the firer, without trigger pressure or crank movement by hand, the pressure being conveyed from a lever below the parapet.

Another demonstration proved the gun to be foolproof, for the chamber was found always to be empty although firing was stopped suddenly in the middle of a burst. The safety-catch also was foolproof, for the heaviest pressure would not move the trigger once the safety-catch was applied. Immunity from derangement was proved first by the use of a gun rusted in every part, and later by submerging an undamaged gun in sea water and liquid mud, by casting sand over it during firing, by kicking it and walking on it, by dropping it from a height of about ten feet, and by burying it under soil and stones as it might be buried during a bombardment. The gun was fired immediately after each of those many outrages without cleaning or oiling, and it showed no loss of accuracy.

The gun is shaped on rifle lines, slightly heavier in stock and butt and considerably heavier in the barrel; but its total weight is only six pounds more than the weight of a service rifle, and it is some twelve pounds lighter than the Lewis gun. The magazine which holds thirty cartridges, is shaped as the section of a circle. It is fixed above the hopper, into which the cartridges fall largely by force of gravity. Each gun has three spare barrels. Replacement of a magazine occupies about three sections and of a barrel eight sections. The breech mechanism is very simple, and contains only four springs.

The trials today proved everything claimed for the gun by the inventor: but, as nothing was said concerning cost, it has yet to be discovered whether the adoption of the weapon by any or all of the services could be financially possible.

Launch of the "Basilisk"

London *Times*, August 6.—The new destroyer *Basilisk* is due to be launched today at the works of John Brown and Company, Limited, Clydebank. Two of the eight destroyers in the 1928 program were ordered from this firm, and the second, the *Beagle*, will be launched in a few weeks. They are of 1,330-tons displacement. Geared turbine engines of 34,0000-shaft horsepower, manufactured by the builders of the hulls, will give them a designed speed of 35 knots. Oil fuel only is used, the capacity being 380 tons. The class should be delivered early in 1931, and will constitute a new Fourth Flotilla for the Mediterranean Fleet, the vessels at present serving in this flotilla being withdrawn for reserve at home.

Central Mess for Officers

London *Times,* August 11.—The Admiralty, towards the end of last year, decided to make a trial of "Central Messing" for the officers. The three vessels chosen for the experiment were the battleship *Rodney* and the cruiser *Hawkins,* both of the Atlantic Fleet, and the cruiser *Delhi,* on the American and West Indies station.

In the *Rodney,* where the experiment has been running since last January, the new system has been an unqualified success. There are no separate galleys for wardroom, gun room, and warrant officers' messes, the cooking for all three being done in one kitchen manned by a staff of seven cooks. This, in itself, represents a considerable saving in space and manpower. All the officers, to the number of one hundred, are catered for by the paymaster-commander as an offshoot to the general mess for the men, and the food, of which I speak from personal experience, is equal to or better than that in any ship in which I have ever served, while its variety is, or should be, sufficient to satisfy the most fastidious. As in the case of the men, the paymaster is allowed 1s. 4d. a day by the Admiralty for each officer on a board. Over and above this sum each wardroom officer pays between £3 and £3 5s. a month, each gun room officer between £1 10s. and £1 17s. 6d., and every warrant officer between 16s. and £1. The menus are chosen by representatives from each mess, and though the food may be simpler in the messes whose members pay the least, the quality is precisely the same in all. Bacon, eggs, cake, honey, and the more expensive varieties of fish, for instance, do not appear in the gun room and warrant officers' messes with the same frequency that they do in the wardroom. One of the chief advantages of the scheme, however, is that there are no extras, afternoon tea, cake, jam, fruit, after-dinner coffee, and so forth being entirely free. This results in a direct saving of between, say £1 and £2 10s. a month to every officer, which in these hard times is very welcome.

A central mess for the officers cannot so conveniently be run in a ship where there is not also a general mess for the men, for the two systems are more or less interdependent. It is possible, too, that in small ships like sloops and destroyers, and in vessels on foreign stations which generally have native messmen and stewards, there are difficulties in the way. In the *Rodney,* however, the system has been so favorably received by all concerned that, if the verdict of this ship be taken by the Admiralty, central messing for the officers is bound to continue. Indeed, I would go farther and say that it is almost certain to become universal in all men-of-war except the smallest.

Australian College Transferred

London *Times,* August 4.—As part of the enforced retrenchment in the public services of Australia, the Commonwealth Naval College at Captain's Point, Jervis Bay, New South Wales, has been closed, and the training of cadets has been transferred to the Flinders Naval Depot, Victoria. No alteration is being made in the technical or scholastic education of the cadets, about fifty in number. Nor are any members of the instructional staff being discharged, but a saving of £30,000 per annum is expected for the amalgamation of the maintenance staffs. About fourteen officers and one hundred ratings who become surplus by the disbandment of the Jervis Bay staff will be drafted afloat as vacancies occur.

The Naval College was opened on February 19, 1915, and took the place of a temporary structure at Geelong, which had been used since March 1, 1913. The first cadets trained at the college were promoted to lieutenant-commander in 1927. Captain (now Admiral) B. M. Chambers, R.N., was the first commanding officer of the establishment, and when he left in 1914 Captain (now Vice-Admiral) C. H. Morgan, R.N., was appointed to the command, and he it was who completed the organization of the college in its permanent quarters. It has since usually been commanded by an officer loaned from the Royal Navy, the last to be appointed being Captain C. H. G. Benson, D.S.O., R.N., who joined in April, 1929.

FRANCE

Review of Battleship and Cruiser Designs

The Naval and Military Record, September 3.—By J. B. Gautreau. For the last twenty years our distinguished ingenieurs de la Section Technique have been behind, in tow of more pushful rivals. They have been afraid of their own imagination and only felt safe on ground trodden by others. The 24,000-ton *Jean Barts* are honorable and

perfected copies of something done elsewhere (*San Paolo* type), the three *Bretagnes* are improved copies of the British *Centurion* class. The five *Normandies,* of 25,000 tons, with quadruple turrets, were something original, distinctly French, with points of superiority over all battleships then existing, and much to the credit of General Ingenieur Doyère; but these ships proved too original, too daring for the distinguished messieurs of the post-war Admiralty Conseil Superieur. They got frightened, and so for safety's sake they decided to discard the half-completed 25,000-ton *Normandies* and, instead, to patch up the obsolete *Voltaires* of 18,000 tons—a patching up that cost as much as would have done the completion of the superior quadruple-turretted cuirassés.

In the cruiser line the *Duquay-Trouins,* of 8,000 tons, though splendid vessels, are undergunned, deficient in antitorpedo armament, and with no original point about them, save, perhaps, in the hull lines. The 10,000-ton *Duquesne* and *Tourville,* very successful in their way, are enlarged copies of the *Duquay-Trouins.* They are probably the fastest of their class in service (35 and 36 knots under service conditions) and have shown wonderful steaming qualities and sea-keeping endurance in the course of ocean cruises of one year and six months' duration. But they have been designed on conventional lines, as if speed and good habitability conditions were everything; they are totally unarmored (at the mercy of a single shell, as Admiral Amet observed); their antitorpedo armament is practically non-existent. On paper they compare badly with the Italian *Triestes,* that boast of 150,000 hp., besides being amply provided with 4 inch quickfirers, and also, it appears, with armor. They are also inferior in defensive qualities to the British *Londons.*

There was something to be said in favor of the *Tourville* design and of the policy of speed. Speed, though *la vitesse n'est pas une arme* (Admiral Daveluy), has good, honorable war records on the ocean. It was speed that enabled von Spee to defer the action at Coronel until sunset. It was speed that brought about the undoing of von Spee and of the *Emden,* speed combined with superior range. It was speed that enabled Admiral Souchon in the *Goeben* to escape from the deadly grasp of superior force. A few more knots and Graf Spee would have escaped to new ventures; escaped for a time only, no doubt for the reason that Germany was wanting in colonial points *d'áppui.* The case is different with France. Strategically she is in a privileged situation for the utilization of the speed factor, only Great Britain excelling her in that respect. Speed, as recommended by Admiral Aube, the eminent founder of *la jeune ecole,* is the very asset to make up for inferiority in numbers or gun power. What is the use of individual ship superiority for a navy condemned to be outnumbered? The *Duquesne-Tourville* represented a well-defined ocean policy, inspired from the lessons of the war —commerce and colonial defense; the mastery of ocean communication lines.

The *Suffren, Colbert, Foch,* and *Dupleix* mark a retrograde step—speed reduced by 3 knots; as a counterpart a thin carapace over boilers and engines, slight strengthening of the A.A. battery and of the seaplane armament. Thus an attempt, hasty and somewhat clumsy, at imitating English and Italian designs. Although these four *croiseurs legers* (from the tests of the *Suffren* and *Colbert*) are good ships, with long-range guns of remarkable accuracy and up-to-date installations for quick salvo firing, besides being wonderful steamers, Gallic naval observers who know and compare are not satisfied with them.

The *Algérie,* though a Washington standard ship and to carry the usual eight guns of 8-inch caliber in twin turrets, is no longer a *croiseur leger* but a bona-fide armored *navire de combat,* fit, in the opinion of her designers, to meet any other 10,000-ton unit now building. Special armor, from 90 to 140 millimeters thickness, will protect her against blows from all directions, the submarine and aërial dangers receiving adequate attention. Her 8-inch guns of new model are believed to be a match, in the matter of range, for the German 11-inch weapons, while being expected to produce a volume of fire twice as great. The *Algérie,* like Italian and British cruisers, will mount A.A. guns of 4-inch bore, eight in number. She will be flush deck, like the English and German ships, with only one funnel, the usual aft tripod mast to be replaced by a short pole mast. Care has been taken to suppress useless top hammer and to do away with items of no military value. The hull

seems to have been designed on new lines, especially in what regards armored subdivisions and bulkheads. This is creditable work, no doubt, on the part of Paris ingenieurs, but no original creative work of the kind displayed in the *Nelson, Rodney,* and in the *Ersatz-Preussen.* France no longer leads; she follows. In itself this spells inferiority. Such a situation is being resented as favorable neither to prestige nor to security. A demand is made for something better and for a *concours* or competition between official and private designers.

ITALY

Cruiser Is Fast

New York *Times,* August 17.—The light cruiser *Alberto da Giussano,* launched April 21, today attained 40.7 miles an hour in a test, a figure claimed as the world record for cruisers. Over a distance of 160 miles an average of 39.3 miles an hour was made.

The ship was designed to develop 95,000 horsepower and make 37 miles an hour, but it actually shows 110,000 horsepower.

GERMANY

Annual Gunnery Exercises

London *Times,* August 28.—The annual gunnery exercises of the German Navy are being carried out in Kiel Bay. The wireless-controlled battleship *Zähringen* has again received many rounds of practice ammunition in her cork-filled interior, and will no doubt soon be ready for more.

The craft engaged include the 25-year-old 13,000-ton battleships *Schlesien, Hannover, Schleswig-Holstein,* and *Hessen,* the *Zähringen,* and the new 6,000-ton cruiser *Königsberg,* with her 65,000 hp., her 32 knots, and her air of strength and speed. The exercises are being carried out north of the Kiel lightship, in a part of the Bay little used by shipping.

Königsberg tried out her nine 6-inch guns on *Zähringen,* which came up at full speed and soon received frequent hits. The unmanned battleship put out a smoke screen under cover of which she doubled in her tracks and tried to escape, but *Königsberg* also turned and began a running fight, to which *Zähringen* simulated a reply by firing rockets—also discharged by the distant controlling hand.

At night *Schlesien* and *Hannover,* steaming in company, were attacked by torpedo boats, in the form of naval tugs towing targets. All the vessls engaged were darkened. At 10:00 P.M. the attacking torpedo boats were sighted by *Schlesien* 4,000 yards to starboard and a salvo of shells was fired which released flares, attached to parachutes, at a height of 1,500 feet above the sea. The attacking craft were plainly revealed and the second salvo from the battleship wrecked the targets.

MERCHANT MARINE

Aid to Shipbuilding by Foreign Maritime Nations

Marine Journal, August 15.—Under the date of August 12 the National Council of American Shipbuilders submitted the following interesting summary stressing the continued and increased aid granted or projected by foreign maritime nations in order to maintain their supremacy upon the seas.

The Svenska Skeppshypotekshassan (Swedish Ship Mortgage Fund), established by Royal Decree of June and November, 1929, is now ready to make loans to Swedish shipowners. This is a government institution with some very interesting regulations and methods.

The basic capital of the fund is furnished by the state in the form of state bonds to the value of $2,680,000. This basic capital is kept intact. Funds for loaning are obtained by the public sale of fund bonds which may be issued up to ten times the basic capital, or $26,800,000. Security for these bonds is the floating property on which the loans are made, plus the basic capital provided by the state.

Five directors manage the fund. The first board was named by the state. In future elections, the borrowers are entitled to nominate a board and the state must select two directors and two substitutes from the borrowers' nominees.

The combined borrowers are responsible in proportion to their unpaid indebtedness for any losses that may accrue to the state by the transfer of any mortgaged vessel to another flag without consent of the board of directors. This is a very interesting form of mutual insurance and regulation.

The first issue of bonds ($5,360,000) was offered publicly on March 1, 1930. These were ten-year 5 per cent bonds offered at

par plus stamp tax of 0.1 per cent. They were over-subscribed in a few hours. Under Swedish law these bonds will be acceptable investments for insurance, trust, and savings bank funds and will make available much capital that has hitherto been barred from shipping investments.

The ship mortgage fund is a flexible arrangement and its basic state-provided fund may be expended at any time to meet the demands of Swedish shipping. (*Pacific Marine Review,* July, 1930.)

The foreign technical papers report that in view of the depression which is now prevailing in the shipbuilding industry, as a result of the difference between cost prices in France and prices quoted by foreign yards, the Minister of the Merchant Marine has worked out two drafts of bills.

One which has just been tabled before the Chamber of Deputies, and which will come under early discussion after the reopening of Parliament in November, 1930, provides for complimentary indirect assistance to be given to French shipbuilders, as under the Credit Maritime. Tabling a bill is a regular step in French parliamentary procedure as this places it in line for reference to a committee. The new arrangements will enable French shipowners to borrow money at a lower interest rate from the Credit Foncier for building new vessels, while another interesting provision aims at increasing the State assistance in ratio to the speed of the new vessel ordered. For passenger vessels, the state assistance so granted by means of the reduction of the rate of interest to be paid by shipowners, is increased when the speed ranges from 20 to 22 knots, then from 22 to 24, then from 24 to 26, and above 26 knots; for cargo vessels, the advantages granted are increased gradually when the speed is higher than 12 knots, then 14 knots and 16 knots.

This bill is intended to ratify the financial arrangements made in order to enable the Cie. Generale Transatlantique to meet the considerable expense involved in the building of the new liner to be known as the super-*Ill-de-France,* which is expected to be ready for service in the spring of 1934. Particulars of the vessel are not available, but it is expected to be of larger dimensions and greater speed than the *Ile-de-France.*

The second draft bill, which has not yet been tabled before Parliament, provides for direct assistance to be given to French shipbuilders per gross tons of vessels built and per 100 kilograms of propelling machinery.

It is understood that this bill will entitle yards to a subsidy of about 400 francs per ton of new ship, the rate to quickly decrease, within a period of say five years, during which the industry should proceed with concentration and rationalization. A subsidy of 100 francs per ton would then be available for a longer period.

A bill for the creation of a Belgian National Maritime Credit Company, which has been deposited in the Chamber of Brussels, provides that the company will have a capital of 100,000,000 francs, to be devoted to the maintenance, extension, and renewal of the Belgian merchant fleet, the state being interested to the extent of 65,000,000 francs and guaranteeing the payment of interest and repayment of capital on bonds of a term of more than five years. (New York *Journal of Commerce,* July 10, 1930.)

According to the Transportation Division, Bureau of Foreign and Domestic Commerce, the Japanese Shipbuilding Industry probably will receive preferred attention for assistance on recommendation of the rationalization committee in the form of preferred treatment to companies of which the majority of capital and management is Japanese. At government request syndicate banks may organize a joint association for industrial loans.

The annual subvention for the Lloyd Brasileiro Steamship Company has been increased from $2,225,000 to $2,500,000 by a federal decree. Simultaneously the Minister of Transportation signed an agreement prolonging the company's contract with the government for another fifteen years.

The steamship company operates passenger and freight lines across the South Atlantic to Europe and to the United States as well as South to the River Plate. Along the Brazilian coast it maintains an extensive service, with ports of call all the way from Rio Grande do Sul in the South to Mancas, the Amazon River city far in the interior. The ships of the line cover a million nautical miles annually.

The line now has a total tonnage of 500,000 including forty-three German boats that were in Brazilian waters at the time of the World War and which were taken over

by the Brazilian government. (New York *Herald-Tribune*, July 27, 1930.)

Through the stoppage of German warship building, and of the generally prevailing distress among shipbuilders, and not least, as a result of the unfavorable economic conditions prevailing in the East, the Schichau Concern in Elbing and Danzig found themselves in financial difficulties. In 1926 it was attempted by the granting of credits, guaranteed by the government and Prussia, to again place the works on a sound basis, but this proved a certain failure. In 1928, a further amount was placed to disposition by the Prussian government, which, however, did not produce the intended result. Finally, it was attempted to carry on the distressed works through the agency of a private works consortium, but these efforts also miscarried. Owing to the condition of the labor market and also for political reasons, the government and the Prussian state are forced to attempt a comprehensive rationalization. According to the prospective law, which has yet to be accepted by Parliament, the Prussian state will participate with an amount of 15.87 million RM.

The efforts of subsidization have produced strong opposition from the major part of the German public. It is pointed out with justice that German shipbuilding is in a very bad way, and that this loan will place a private concern in a position to underbid the other shipbuilding yards, which carry on without subsidy. (*Scandinavian Shipping Gazette*, July 16, 1930.)

New Cargo and passenger service is to be established between Trieste, Shanghai, and Bombay by the Lloyd Triestino, which company will receive a subsidy from the Italian Government for the building of new cargo and passenger vessels. On the Shanghai service three vessels will be operated. The monthly cargo service to Bombay will be carried on by the motor ships *Fusijama* and *Himalaya*. These combined services will give thirty-six sailings per year for Bombay and twenty-four for China.

ENGINEERING

The Diesel Engine

Merchant Marine Bulletin, September.—Rudolf Diesel, the German engineer, who designed the Diesel engine, drowned himself in the English Channel in September, 1913. He jumped from the deck of a channel steamer because his engine, patented twenty-one years before, had met with scant commercial success. Engineers had accepted it, but *entreprenuers* were apathetic—and shrewd. They were not sufficiently interested to buy the patent rights from the inventor. They preferred to wait until Diesel's patents expired, which they did in 1912. On that confused and troubled night in September, 1913, things looked not at all promising for the engine's future.

Like many another suicide, Rudolf Diesel jumped at just the wrong moment. Had he waited one year, he would have seen the warring nations rushing the construction of his engines for submarine surface propulsion. He would have seen his great machine started on the upward curve of its meteoric career, a curve that today points more sharply upward than ever before. He would have seen 440,000 horsepower of his engines turned out annually in this country alone. On the sea the Diesel reigns supreme among practically all classes of ships except the superliners. Its most brilliant triumphs are the three motorships, the *Saturnia* and *Vulcania* (24,000 tons each) and the *Augustus* (33,000 tons), built by Italy for de luxe passenger service. Last fall Canadian National Locomotive 9,000, driven by electricity generated by Diesel motors, was a nine days' railroad wonder. And this April an even more sensational application of Diesels, to aircraft, was a nine days' aviation wonder. The recent tragic death of the designer, Captain J. M. Woolson, of Packard Motors, focused popular attention still more sharply on his engine. Already the Diesel is used on 54 per cent of world shipping tonnage under construction. And now within a year it threatens to make further incursions into transportation by rail and air.

Great things have been done with Diesels, and great things remain to be done. But there is small prospect of the world's prime movers going completely, or even largely, Diesel. From a horsepower point of view, Diesels are the *bourgeoisie* of enginedom. Below 100 horsepower is the vast and potent proletariat of automobile engines, each of them small in itself, but in the aggregate the most important group of prime movers. Above 20,000 is the horsepower aristocracy

of the great turbines, steam, and water, which drive the wheels of industry on land and the propellers of superliners on sea. The Diesel occupies a middle class of from 100 to 20,000 horsepower, which takes in moderate-sized ships, contracting equipment, smaller power plants, pumps, and general industrial uses. This is a broad domain, but the automotive and superpower domains are both greater in terms of horsepower. The Diesel is confined to the middle class by a series of limitations, some of them inherent, some of them now being removed by engineers. These limitations, and the peculiar advantages of the Diesel as well, can be understood only by peering for a moment into the mechanics of the Diesel.

Both the Diesel engine and the ordinary automobile motor are internal combustion engines, which means they get their power by starting a fire in a confined space. The point of departure between the two is in the methods they use to start this fire. Automobiles do it by putting gases under pressure and then striking an actual spark of fire in the cylinder. Diesels do it by compressing the air in the cylinder about 500 pounds a square inch (as against 40 to 90 in automobiles), thus making the air terrifically hot. Oil is then shot into the cylinder. On coming into contact with the hot air it bursts into flames, which expands the air in the cylinder, which forces back the piston, which turns the motor, and so on.

The strong points of this motor are, first, thermal efficiency, which refers to the percentage of heat from the fire that is converted into power. In a Diesel this percentage is roughly about 30 per cent as against a gasoline motor's 20 per cent, a steam turbine's 25 per cent and a locomotive's 6 per cent. The ability to use low-priced fuel is also important. The high temperature obtained by compressing the air in the cylinder, a temperature of 1,000 degrees Fahrenheit, makes it possible to consume fuel oil or even coal dust satisfactorily, because these fuels at that temperature are completely volatilized and burned at once. Fuel oil is not only cheaper than gasoline (six cents a gallon is a good price) but is also noninflammable, except at the high temperature produced in the cylinder. Diesels thus eliminate fire hazard.

The limitations of the Diesel are equally definite. For smaller horsepowers, Diesel calibration (fuel measuring) offers great difficulties. Any engineer knows that the mechanics of sucking a vaporized mixture of gasoline and air into a cylinder are much simpler than those of forcing in an infinitesimal drop of oil against a 500-pound pressure. The smaller the horsepower of the engine, the smaller the drop and the more hair-splittingly accurate must be its measuring. As a mass producer of superpower, the Diesel is limited by its very excellencies. The outstanding virtue of the Diesel is its even efficiency at all speeds and all powers. And the Diesel's main handicap in superpower competition is the converse of this virtue; it does not gain efficiency as its size increases. A big turbine does; the bigger it gets, the cheaper it is to build and the cheaper it produces power. Diesel power costs the same per kilowatt no matter what the size of the installation.—*Fortune.*

The Dardelet Self-Locking Screw Thread

The Engineer, August 20.—Although we have had neither the time nor the inclination to calculate the length of bolt required to accommodate all the nut-locking devices produced so far, we are confident that both the task and the bolt would be a very long one. The number of such inventions is, perhaps, a measure of the importance of the problem, and the fact that they continue to appear is certainly an indication that it has not yet been solved to the satisfaction of all concerned. Sometimes nut-locking devices which would be quite effective depend upon the employment of a separate part which may be omitted, others require special tools for the application or removal, involve a special operation which may be forgotten, or are costly and complicated. These and other drawbacks of a similar character appear to be absent from a device to which our attention has recently been called, known as the Dardelet self-locking screw thread, and illustrated in the accompanying figures.

As will be seen, the forms of the threads for the nut and bolt are somewhat different. The portion of the bolt between the threads is made slightly tapered, with the parts of smaller diameter nearer the head, i.e., towards the left in the figures, while the crests of the threads in the nut are tapered to the same angle in both directions. Figure 1

shows the relative positions of the bolt and nut while the latter is being run on. The thread of the nut, it will be seen, then moves in the deepest part of the groove on the bolt, and as there is ample clearance, the nut can easily be applied with the fingers only. When, however, the nut is seated on to the work it first takes up the position on the bolt shown in Figure 2, in which one of the tapered surfaces on the crests of the threads of the nut makes contact with the tapered surface between the threads on the bolt, and the locking effect commences. This is completed by tightening up the nut with an ordinary spanner, the nut, owing to the slight stretching of its material, finally taking up the position shown in Figure 3, in which the threads on the nut abut against those of the bolt. It will be noticed that with the nut in the locked position the load is mainly supported on the abutting surfaces of the threads.

In tensile tests, carried out at the National Physical Laboratory, on four ½-inch bolts screwed and fitted at one end with Whitworth nuts and at the other end with Dardelet nuts, the former failed in all cases while the Dardelet threads and nuts were undamaged. Similar results were obtained in comparative tests with British standard fine threads and Dardelet threads. In impact-tensile tests carried out at the same institution, the energy absorbed in fracturing the Dardelet bolt and nut was found to be 71 per cent greater, on the average, than the corresponding figures for British Standard Whitworth bolts of the same size, tested under identical conditions. For these tests, four pairs of ½-inch bolts were machined from two bars of mild steel and two of free-cutting steel, one bolt in each pair being screwed with a Whitworth thread and the other with a Dardelet thread. Special nuts, having a threaded length of 1⅛-inch, were fitted to each bolt, but the two bolts forming a pair were not separated until after their arrival at the laboratory; there can thus be no question that the same material was employed in each pair. The actual figures for the energy absorption, in the case of the mild-steel bolts with the Dardelet threads, were 466 foot-pound and 384 foot-pound and for the bolts of the same material with Whitworth threads, 278 foot-pound and 236 foot-pound. The corresponding figures for the bolts of free-cutting steel were 462 foot-pound and 359 foot-pound with the Dardelet threads, and 220 pound and 250 pound with the Whitworth threads.

Dardelet bolts and nuts were also subjected to vibration tests on the shaking ma-

Fig. 1.

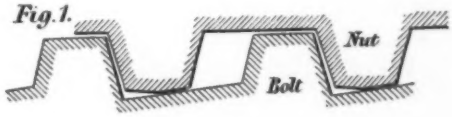


Fig. 2.

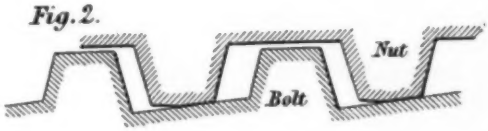
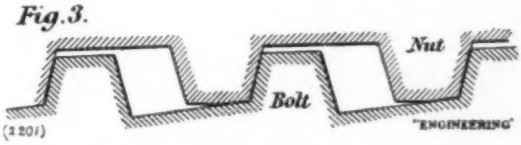


Fig. 3.



chine of the laboratory, the bolts being used to attach masses of about 12-pound weight to various parts of the vibrating frame of the machine. The average speed of the oscillator on the frame was 1,230 r.p.m., and the amplitude of the motion was from ⅛ inch to 3/16 inch. The test was continued for a total duration of 70 hours 40 minutes, during which the frame received about 5,250,000 vibrations, but at the end of the test no movement of the nuts on the bolts could be detected. The nuts and bolts are made in this country by Messrs. British Dardelet Threadlock (D.D.G.) Corporation, Limited, whose London office is at 42, Kingsway, W.C.2, their works address being Gorst Road, North Acton, Middlesex.

AVIATION

The Use of Aircraft Carriers

Army Navy and Air Force Gazette. July 24.—The government still has under consideration the possibility of sending an aircraft carrier to the Buenos Aires Exhibition in March next. Such a step would undoubtedly be of great advantage to our trade with the important South American markets, and would add to British prestige generally. Yet the project is not quite so simple as some would make out. In the first place, it is

very costly, and it is a matter for the Cabinet—not the Admiralty—to decide whether the extra expenditure is justified in all the circumstances. The statement in a contemporary that the Admiralty had offered to send an aircraft carrier, provided that the British aircraft industry will pay for the oil fuel, is absolutely without foundation. The matter is one for the government. When they have declared their policy, all the Admiralty have to do is to see it is carried out. Secondly, it must always be remembered—though it is frequently forgotten—that the fleet exists for the defence of the Empire, and that in common with other sections the Fleet Air Arm requires to be trained as a fighting machine. Opportunities for such training in these days of rigid economy are severely limited, and the loss of one of its two carriers by the Atlantic Fleet for some weeks at the most important period of the year from the training standpoint, when the combined exercises are held with the Mediterranean Fleet, would be a very serious matter. To train fleet pilots they must work with the fleet, which is the reason that no carriers have yet been attached to our isolated small squadrons in the East Indies, or Africa, or American waters. If either the Atlantic or Mediterranean Fleets were in the habit of making a cruise down the South American coast, the carriers would accompany them as a matter of routine. But they are not, nor are likely to while the fuel allowance remains at its present standard. It seems rather a pity that the *Hermes,* from the China Station, should have to come home this autumn to recommission instead of next spring, as opportunity might then have been taken for her to return to the Far East *via* South America. But her ship's company relief is already overdue, as they commissioned her in December, 1927, and will have been nearer three years than the normal two and one-half years in her by the time they pay off.

Kelly Field Records

Aviation News. August 22.—San Antonio.—Records of the Air Corps Advanced Flying School, Kelly Field, reveal that the annual output of airplane pilots has been practically quadrupled during the four years the Air Corps training center has been in operation.

The training base was organized in 1926 and Brig. Gen. Frank P. Lahm was placed in command. The first year seventy-eight airplane pilots were graduated, but the second year the number of graduates dropped to seventy-one. Approximately three-fourths of all students entering the primary school were eliminated before finishing their classes at Kelly Field.

With the June class of 1928 the present system of training was put into effect and both the number and percentage of students graduating increased rapidly. Three classes graduated 188 airplane pilots during the third year, and a total of 306 flyers graduated during the year ending June 30, 1930.

General Lahm has completed his four-year tour of duty here and has gone to San Francisco to become air officer of the Ninth Corps Area. Brig. Gen. Charles H. Danforth has taken over command of the school.

Helium Output at Amarillo

Aviation News. August 2—Washington. —Producing more helium than has ever been turned out before by a helium plant in one month, the government plant near Amarillo, Texas, during May, produced 1,230,350 cubic feet of gas containing 93 per cent, or 1,204,900 cubic feet of contained helium.

Operating costs per 1,000 cubic feet of helium refined were also the lowest on record, reports the Department of Commerce, and are claimed far below figures deemed attainable by authorities on helium production a few years ago.

During May the second separation unit of the plant was completed, tested, and operated on a preliminary basis.

Although production exceeded the largest month's output of the government's Fort Worth helium plant, which formerly supplied the Army and Navy and also exceeds any previous month's production at the Amarillo or any other plant, the operation was at only about 60 per cent of the plant's capacity when both units are in continuous operation. The output of the Amarillo plant is limited by the demands of the Army and Navy for helium rather than by its capacity to produce.

The gross operating costs for May, which represent the current expenditures from the United States Treasury to operate and maintain the plant and gas field and to cover supervisory expenses in Washington were $13,146.86, or $10.91 per 1,000 cubic feet of

contained helium produced. This compares with a gross operating cost of $14.38 per 1,000 cubic feet during April.

There was a return to the treasury of $3,794.75 from sale of the plant's residue gas during the month.

Deducting this return from the gross operating cost, gives a net operating cost of $9,352.11 or $7.76 per 1,000 cubic feet of contained helium. In April the net operating figure was $11.49. Production of an equivalent amount of helium at the Fort Worth plant, even when its costs were the lowest, required expenditures of over $30,000.

At the May costs, helium to fill one of the 6,500,000 cubic-foot-airships now being built for the Navy could be produced by the Amarillo plant with net expenditures from the treasury of about $50,000.

The National Air Races

New York *Times*, August 31.—Never have aëronautical spectacles been quite so intricate and fascinating as those shown on the field of the National Air Races at Chicago. Altogether, there will have been ten days and nights of flying. A great change has come over the annual exhibitions reflecting the progress of aviation. Ten years ago the national air races, known at first as the Pulitzer races, were mainly military events: the Army and the Navy were blazing the way for commercial flying. Beginning with 1926, the National Air Races came under civilian supervision. Of nineteen events, only five were exclusively military. At Chicago this year the number of races and competitions was forty-four, of which five were military and divided between the Army, Navy, Marine Corps, and National Guard. It is the day of the commercial pilot. The last five races on the list were limited this year to private plane owners and sportsmen pilots, a fact of great interest to the manufacturers, who hope to develop a profitable business by encouraging private flying.

These annual exhibitions benefit by intelligent criticism. The management this year has been exceptionally capable. At Cleveland in 1929 the program was admirably planned with the idea of promoting the industry's best interests. The events were somewhat crowded, but so rapid is the progress of aviation that it is difficult to keep the number down. This year the display has been expanded even more. Chicago set out to excel Cleveland. The amount needed for the arrangements was oversubscribed. The list of directors included many men of national reputation. Profit or no profit, Chicago was out to break all records, and behind the unflagging energy was a design to make the lake metropolis the strategic center for airway services. Comparisons will be made with the successful Cleveland show.

The National Air Races promise to be the premier sporting attraction of the year, in Europe as well as in the United States. Europe has been well represented at Chicago by crack pilots, who have vied with our best in acrobatic flights. Without discrimination, Marcel Doret of France may be mentioned as a master of thrills at Chicago. All day and into the night, event succeeded event, with excellent control by the management. Sixty-five thousand people have looked on with amazement at the military formations and the close finishes of the civilian competitions. Meanwhile, derbies from West, South, and East were finishing. It was significant that the arrival of Colonel Lindbergh excited even more interest than the races. He seemed to personify the progress of aviation in America. Whether a racing triangle of five miles will be retained may be doubted. The spectators, however, have been able to watch every contest from start to finish. The demand for speed has been gratified in full measure. There can be no dispute about the fact that fast flying in transportation is now the purpose of manufacturers and transport companies.

The Naval Aircraft Program

Aëro Digest, August.—The Five-Year Aircraft Building Program of the Navy Department will be completed by July 1, 1932, with 1,000 "useful" airplanes in service, according to a recent announcement of officials of the department. A final appropriation of $12,326,100 has been made available to carry out the act of June 24, 1926, which enacted the aircraft building program of the Navy Department. On June 30, 1930, the Navy had 928 serviceable airplanes and 267 in order.

The fiscal year 1931, is the last appropriating year of the program. Deliveries of the aircraft contracted for during this fiscal year, 1931, should be completed by the end

of the following fiscal year, according to the terms of the program. The 267 new ships on order and the 1931 appropriation are expected to bring the total of useful ships to 1,000 by 1932.

According to present plans, 667 planes will be kept in operation with the remainder held in reserve. The five-year program includes a crash wastage and a wastage resulting from types becoming obsolete of fifteen planes for each one hundred in use annually.

The five-year building program was inaugurated following the Conference on Limitation of Naval Armament by the Bureau of Aëronautics which outlined a contemplated development of aviation in the Navy. The fundamental principles contained in the tentative program were incorporated in the United States Naval policy which was approved by the Secretary of the Navy, December 1, 1922. In order to formulate an aircraft building program from the viewpoint of economy and utility, it was decided to extend the program over a period of years. At the end of this period the completion of all units required by the Navy treaty during times of peace was contemplated. Although the program had been delayed from year to year because of lack of authorization and appropriations, it remained basically the same as it was in its original form.

Congress did not take cognizance of the five-year aircraft building program until 1926 when, at the request of the House Naval Affairs Committee, the Bureau of Aëronautics prepared data as to the needs of aviation in the Navy and submitted a development program projected over a five-year period. With this program as a basis, the 1,000-plane program was evolved, the completion of which was the supply of the Navy Department and the Marine Corps with 667 operating and 333 reserve planes of all types at the end of the five-year period.

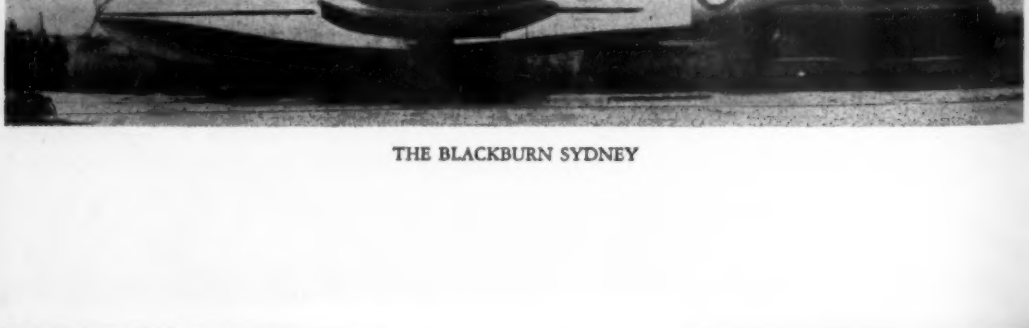
The construction of two rigid airships suitable for use as adjuncts to the fleet, the total cost of each ship not to exceed a total cost of $8,000,000 for both, was authorized in 1926; and one experimental metal-clad airship at a cost not to exceed $300,000.

The total amount appropriated by Congress for purchases of airplanes during the fiscal years 1927-1929, inclusive, is $52,445,500. The five-year act of June 24, 1926, authorized a total appropriation of $65,032,500 for these four years. The amount appropriated for the purchase of airplanes for the first four years of the program is $12,552,000 less than the amount authorized.

At the beginning of this program, July 1, 1926, the Navy had 351 useful planes on hand; 468 in 1927; 624 in 1928; and 829 in 1929. The Bureau of Aëronautics has allotted one-third of the planes to the battle fleet and has placed more than one-half of its total aircraft afloat with the battle, scouting, and Asiatic fleets.

British Patrol-Type Flying Boat

Army Navy and Air Force Gazette. September 4.—The Blackburn *Sydney* monoplane flying boat (three 525 hp. Rolls-Royce F.XII. M.S. engines). Constructed of metal with fabric covering for the planes. There is accommodation for five—pilot, second pilot-navigator, wireless operator, engineer,



THE BLACKBURN SYDNEY

and gunner. The bow cockpit accommodates a machine gunner and is used in towing and mooring operations. Next behind is the control cabin with two seats. A watertight bulkhead separates this cabin from the rest of the boat aft. Behind the bulkhead are two cabins for wireless and navigation respectively. Sleeping quarters are further aft. When fully loaded the gross weight is nearly ten tons. Maximum speed should be about 120 miles an hour.

Nonstop Flight to Canal Zone

U. S. Air Services—September.—Aviation history was made recently when a crew of four Army airmen, commanded by Lieut. Col. Jacob E. Fickel, executive officer of the Air Corps Material Division at Wright Field, Dayton, Ohio, landed at France Field, Canal Zone, after a nonstop flight in a Ford tri-motor transport plane from Miami across the blue wastes of the Caribbean. The plane with its heavy gasoline load covered the 1,140-mile jump in eleven hours, twenty minutes.

To military men, the flight was of great tactical interest as it demonstrated the practicability of direct air contact between continental United States and Panama without the necessity of crossing any country but Cuba. From a military viewpoint this is considered important.

Of greater interest, perhaps, was the fact that the big Ford plane still had 200 gallons of fuel in its tanks when it was landed at France Field. The weight of this amount of gasoline is greater than the weight of a great demolition bomb, proving that the Ford transport could have carried such a missile to its objective.

Lieut. Albert F. Hegenberger, who was co-pilot of the flight, won international fame four years ago when he successfully navigated an Army plane in the first flight between the Pacific coast and Hawaii. Lieut. E. C. Whitehead, who was a member of the Army South American Good Will flight was co-pilot and Sergeant K. D. Wilson radio officer.

Despite the fact that the plane carried in the cabin 440 gallons of gasoline weighing more than 2,500 pounds, in addition to the 300 gallons in its tanks, it took off easily after a 900-foot run in the early dawn. Average weather conditions were encountered during the flight, the plane having favoring winds part of the time and head winds the remainder.

The navigation throughout the flight was by compasses, no astronomical observations being taken, the plane being held on its direct course without difficulty, and reaching a landfall at the Canal Zone within two miles of a mark aimed at. Throughout the flight Colonel Fickel was in constant communication with pilots in the cockpit by means of a telephone.

At three o'clock in the afternoon of the flight, after all but 250 miles of the course had been covered, Colonel Fickel, the navigator, radioed to the Army station at France Field that he would arrive at 5:30 P.M. The landing was made at 5:30 P.M. to the second.

The plane carried for emergency a rubber boat capable of inflation by carbon dioxide, and equipped with an 8-pound radio set powered with a 6-volt battery and having a range of fifty miles. Needless to say, its use was unnecessary.

*Blind Flying by Captain Arthur Page, U. S. Marine Corps**

U. S. Air Services—September.—Captain Arthur Page, U.S.M.C., in a Standard Navy Observation plane, *O2U-1*, equipped with standard instruments and a radio beacon receiver of both the oral and visual type, recently successfully flew the radio controlled airways from Omaha, Nebraska, to Washington, D.C.

Captain Page, sealed in a blind or hooded-over cockpit, took off blind from Omaha at 6:00 A.M., July 21, for the U. S. Naval Air Station, Anacostia, D.C., *via* Chicago and Cleveland. At noon, Page brought the plane directly over the radio beacon, altitude 200 feet, at the Municipal Airport, Chicago, when Lieut. V. M. Guymon, U.S.M.C., assistant pilot for landings, took the controls and landed the plane. During this first leg of the flight Page was in constant receipt of messages from the Department of Commerce station at Des Moines, Sterling, and Chicago, receiving oral direction indications and hourly weather broadcasts by voice.

After a hurried fueling and a bite of lunch at Chicago Page again took off blind, at 1:00 P.M., and headed for Cleveland and, following the radio course broadcast from

* Captain Page lost his life in an airplane accident at the National Air Races, Chicago.

Chicago, Goshen, and Cleveland, being at all times in receipt of messages from one or more stations. At 3:30 P.M. Page brought the plane directly over the radio beacon at the Cleveland Airport when Guymon again landed. The plane, however, was brought to the landing point by radio, and the actual landing of the plane by Guymon at Chicago, Cleveland, and Anacostia was the only maneuver performed from the open cockpit.

After fueling, a third take-off was made by Page, who had again been sealed in the blind cockpit, and the plane headed for Washington. On this last run it was necessary to fly by compass for the first 100 miles out of Cleveland as there is no radio beacon pointed towards Washington from Cleveland. At this point Page picked up the Bureau of Standards experimental visual radio beacon, located at College Park, Maryland, and followed these visual signals through to Washington, where Guymon brought the plane to a landing at 6:45 P.M. at the U. S. Naval Air Station, Anacostia, D.C.

Both Captain Page and Lieutenant Guymon were in excellent spirits, although slightly fatigued. Page did not praise the temperatures experienced in the closed cockpit of his Vought *Corsair*.

He reported the weather cool and delightful at Omaha, and flying pleasant until Cleveland was reached, where apparently they first struck the hot wave. He was considerably surprised when informed by Guymon that he had flown directly through a severe storm over the Allegheny Mountains. Due to certain water leaking into the cockpit Page knew it was raining, but Guymon reported the storm so thick that the visibility was reduced to zero, and could probably only have been weathered by radio controlled flight.

Admiral W. A. Moffett, Chief of the Bureau of Aëronautics, sponsored this flight as a demonstration of standard Navy material and instruments, aided by a direction radio set developed by the Department of Commerce.

MISCELLANEOUS

Difficult to Change Liners into Warships

Baltimore *Sun*, August 30—By Hector C. Bywater.—From an American correspondent I have received a courteous letter, in which he challenges my oft-repeated assertion that, under the London treaty, the United States will again complete parity of sea power with the British Empire.

Acknowledging that this may be true as regards men-of-war proper, he draws my attention to the "overpowering advantage" that Britain still possesses by reason of her "vast fleet" of high-speed liners, "all of which are capable of being quickly converted into 6-inch-gun cruisers, or, alternatively, large-capacity airplane carriers." This, I am aware, is a stock argument of the naval enthusiasts on your side and one that has been used with great effect in molding public opinion.

That the British mercantile marine is an important element of the national sea power cannot be denied. It certainly played a big part in winning the World War and would, without doubt, play an important rôle in any future maritime war in which we might be involved. But it is as carriers of essential supplies rather than as potential war craft that our merchantmen constitute an asset of maritime power. As armed cruisers they proved a distinct failure in the war. The famous duel between the *Carmania* and the *Cape Trafalgar* came near to being a Kilkenny Cat affair.

The big liner *Kaiser Wilhelm der Grosse* was easily disposed of by a few 6-inch shells from H. M. S. *Highflyer*, and many other instances of the vulnerability of the merchant ship, as compared with the regular fighting ship, could be cited.

Mention is often made of the Tenth Cruiser Squadron, composed of armed liners, which maintained the northern line of blockade.

This squadron, it is true, did splendid work, but if the Germans had had the enterprise to send out a single battle cruiser, or, for that matter, a division of light cruisers, our northern line would have been rolled up and obliterated. As it was, the squadron suffered heavily from submarine attack. Several of the ships were lost, and in nearly every case a single torpedo sufficed to send them to the bottom. It is not of such brittle craft that a fighting fleet can be formed.

The conversion of a merchantman into an airplane carrier is not so simple a task as it may sound. During the war the old Cunard liner *Campania* was taken over by the Admiralty to be transformed into a car-

rier for duty with the Grand Fleet. The work occupied eighteen months, and even then proved unsatisfactory. From their own experience with the *Langley*, originally a fleet collier, American naval experts must be well aware of the complicated nature of such a job.

There is, however, little doubt that merchant ships will be used as combatant units in a future struggle at sea. Their employment in this way is, in fact, inevitable, owing to the paucity of regular cruisers. The British Empire, with only fifty cruisers at its disposal, would be compelled to arm merchantmen in order to provide an adequate patrol force for its 80,000 miles of trade routes. But it must be emphasized that these auxiliaries could only act as police, and would be formidable only against armed enemy raiders of the *Moewe* and *Wolf* types. They would fall an easy prey to a man-of-war.

It is noted with interest here that the American naval authorities, in consequence of recent legislation, now exercise a certain control over the design of every ship which is built with the aid of Government funds. It may be, therefore, that the latest American merchantmen embody certain protective devices, besides having their decks specially strengthened to carry 6-inch or lighter guns. When the *Malolo* left New York on her maiden trip Admiral W. S. Benson, U.S.N., said in a speech that she had been built with a view to eventual service as an auxiliary cruiser. The British Admiralty has no such jurisdiction over the plans of British mercantile ships.

Passing to another subject, France and Italy have both decided to continue the building of 6-inch cruisers, but it is significant that their new ships are to be much slower than those already built.

Judging from published plans, the French *Duquesne* class and the Italian *Trentos* are among the most fragile warships afloat. They carry practically no armor and their hulls are packed almost from end to end with machinery. They are, indeed, primarily speed machines. In the case of one vessel—which had better be nameless—I am credibly informed that the firing of her own guns usually causes damage extensive enough to necessitate a visit to the navy yard. It is hard to imagine any ship of this type surviving a single salvo of 8-inch, or even 6-inch, high-explosive shell.

The new French 10,000-ton cruiser *Algérie*, which is to be laid down at the end of this year, will be of a very different type. She will be engined for 32 knots only, instead of 35 to 36, and the weight saved in the engine room is to be invested in armor protection. There will be a 6-inch belt on the water line and a strong steel deck over vitals. Italy is following the same procedure in her *Zara* class of four ships. From 36 knots she will come down to 32, and instead of being "tinclads" like the *Trento* the new ships will have 5½-inch armor plating on their sides.

To anybody who has witnessed the devastating effects of modern naval gunfire it is amazing that any naval staff should have sanctioned the building of large ships practically devoid of protection. That superior speed is a substitute for armor was tragically disproved at Jutland, where three of our thinly plated battle cruisers were blown to pieces by the slower but heavily armored German ships. The tremendous drawback to the 10,000-ton treaty cruiser is the technical impossibility of endowing it with adequate armor protection. High speed and an 8-inch battery must be provided for, and when this has been done there remains next to no margin for defensive qualities. A French writer recently referred to these vessels as "coffin ships." Perhaps he is not far wrong.

No details of the British *Leander* class have been released to date. The nameship has been started at Devonport, and the other three are due for laying down about next April. They will displace less than 6,000 tons and carry a battery of 6-inch guns. As I mentioned in a previous article, our naval men are under no illusion as to the fighting value of these little craft as compared with the 9,500-ton 6-inch cruisers which are projected both in the United States and Japan.

From the purely military viewpoint they are not a sound investment, but our hands are now tied and it is a choice between building these feeble ships—of relatively negligible fighting value—and building nothing at all to replenish our dwindling cruiser fleet.

NOTES ON INTERNATIONAL AFFAIRS

From August 3 to October 3

Prepared by Professor Allan Westcott, U. S. Naval Academy

LATIN AMERICA

Revolution in Argentina. Although there had been warnings beforehand, including concentration of troops and war vessels, guard on the president's living quarters, and mob disturbances in Buenos Aires, the complete abandonment of President Irigoyen of Argentina by the military forces, and his overthrow on September 6, came with surprising suddenness. On September 5, apparently as a temporizing measure, Irigoyen turned over the government to Vice President Martinez, though without actually resigning. But during the following night troops controlled by opposition military leaders marched into the capital and assumed political control. There was some violence on the part of mobs which raided Irigoyenista newspaper offices and political headquarters, but the total casualties from the *coup d'etat* numbered only thirty-two killed and some three hundred injured. President Irigoyen, though suffering from illness, fled to La Plata and took refuge in an army barracks, but was later held aboard a government cruiser. On September 8 General José Uriburu, chief of the revolutionary junta, took the oath of office as provisional president, pledging constitutional rule and new elections, though it developed later that constitutional changes were to be made which would postpone the elections for at least six months' time. Within ten days thereafter the new government was recognized by the United States, Great Britain, and practically all other countries with which Argentina has commercial relations.

Irigoyen's downfall, carrying with it the ruin of the Radical party organized around his personality and with the aid of which he had maintained himself in power for fourteen years, was attributed primarily to the hard times in Argentina due to a tremendous decline in exports, especially grains and meats. Politically, there had developed an increasing weariness of one-man rule, with corruption in public office, hostility toward Congress and the moneyed classes, and a narrow, unenlightened conduct of foreign affairs.

Leguia Overthrown in Peru. A political upheaval occurred in Peru on August 25 when President Auguste B. Leguia, who since 1919 had ruled the country with practically absolute power, was forced to resign and put to sea in a still loyal Peruvian cruiser. The revolution was carried through without bloodshed by a military junta headed by Lieut. Col. Luis Sanchez Cerro, who led the beginnings of the revolt at Arequipa and in the southern provinces. Opposition to Leguia centered on his ruthless method in carrying out policies looking toward Peru's ultimate economic development, and his alleged favoritism toward American capital. American investments in Peru amount to about $250,000,000.

The cruiser on which Leguia escaped was recalled by wireless and the ex-president was later put on trial for peculation and other offenses, together with ex-premier Heros and numerous other former officials. The provisional government under Cerro was formally recognized by the United States on September 18, along with the new régimes in Bolivia and Peru, Secretary Stimson justifying his quick recognition of these governments set up by revolution on the ground that this action would tend to help American trade and relieve economic depression. American recognition was facilitated by the release on September 7 of Lieutenant Com-

mander Harold B. Grow, U. S. Naval Reserve, of the American Naval Mission, who became head of the Peruvian air forces and had been despatched by Leguia on a bombing raid against Arequipa.

OTHER POLITICAL DISTURBANCES. The epidemic of revolution which spread quickly from Bolivia to Peru and Argentina appeared threatening also in other Latin-American states. Uprisings were reported in Brazil in the province of Rio Grande do Sul, but were quickly though not authentatively denied.

WORLD COURT

KELLOGG ELECTED COURT JUDGE. Former United States Secretary of State Frank B. Kellogg was on September 25 elected by the League Council and Assembly to serve as a judge of the Permanent Court of International Justice for the full term of nine years from January 1, 1930. He had previously been elected to fill the vacancy up to that date caused by the resignation of Charles E. Hughes. Fifteen judges in all, together with four deputies, were chosen by the Council and Assembly. Five of the judges selected had previously held the office, and two were former deputies. Three judges were chosen from Latin-American states.

DELAY IN RATIFYING COURT PROTOCOLS. Progress toward bringing about American participation in the World Court was held up when it developed in a League Committee that Cuba, alone among member-nations of the Court, had raised objections to the protocol revising the original World Court Statute of 1920. Cuba's objections were apparently trivial, relating to the increased number of judges, increased expense, and also the new requirement that judges remain permanently at The Hague. Her stand nevertheless barred the way toward American entry, since the proposed changes are necessary to meet the conditions stipulated in the United States Senate reservations. No great regret at the delay was felt in government circles in this country, for there would have been little time to submit the question to the Senate before the end of the next session on March 4, and little prospect of favorable action if it were submitted.

LEAGUE OF NATIONS

LEAGUE COUNCIL AND ASSEMBLY SESSIONS. The eleventh session of the League of Nations Assembly and the sixtieth session of the League Council opened at Geneva on September 10, in a general atmosphere of discouragement arising from world-wide economic depression, political uncertainty in Europe due to friction between France and Italy and the strong nationalist trend in the German elections, and revolutionary disturbances in China, South America, and British possessions. Nicolai Titulescu was elected president of the Assembly, and the first week of its session was taken up chiefly by speeches of delegates from the chief powers. Foreign Minister Henderson of Great Britain insisted on September 11 that England wanted definite progress toward disarmament before entering into further pledges or agreements for security, whereas Foreign Minister Briand, appealing on the same day and later for his scheme of a European union, with its inherent idea of mutual political guaranties, made it very clear that France still stands for security first, and in M. Briand's own words "holds it her duty not to be a dupe, lest she in turn become a victim."

COVENANT AND KELLOGG PACT. At the opening of the Assembly, the British delegation, supported by France, Italy, and other powers, introduced a resolution calling for a committee to consider revision of the League Covenant in order to eliminate definite sanctions of war, and thus bring it into harmony with the Briand-Kellogg Peace Pact. This would call for changing Articles XII and XV of the Covenant by cutting out (a) the right of a nation to "resort to war" three months after an arbitration decision, (b) the right of a disputing nation to resort to war against an opponent who rejects a League Council decision, (c) the right of all League members to take such individual action as they may consider necessary if the Council fails to reach a unanimous decision in any dispute laid before it. This matter was referred to the first committee of the League, but there was considerable sentiment against any changes in the phrasing of the Covenant, especially on the part of Japan and some of the smaller powers, and it appeared highly unlikely that anything would be accomplished this year.

AID TO VICTIMS OF AGGRESSION. The Assembly on September 29, after four years' consideration, finally approved the draft convention providing financial assistance for states victims of aggression, and on October 2 it was signed by twenty-eight nations. Action on this convention was hastened by assurances from the British government of readiness to sign it, with the stipulation, however, that any nation in order to benefit by it must have fully accepted the treaty of disarmament which, it is assumed, will be the outcome of some future conference. It is estimated that the amount available for such assistance may be as high as $250,000,000.

British support for this measure was in line with the Labor government's manifest enthusiasm for the cause of world peace, shown earlier in the ratification last August, by the United Kingdom and also the dominions, of the "optional clause" signifying acceptance of the compulsory jurisdiction of the World Court in all legal disputes.

DISPOSAL OF PAN-EUROPE PLAN. At a meeting of the twenty-seven European powers at Geneva early in the Assembly session it was unanimously agreed that the question of a European union should be put on the agenda of the Assembly, thus carrying out the idea of those nations led by England which insist that the union must be an offshoot of the League and created by it. The Assembly proceeded to turn the matter over to a committee, consisting of representatives of the same twenty-seven powers, which was to report to the Assembly next year with a concrete plan for "closer collaboration" of European nations, acting in consultation with the League secretariat and non-European powers, and always with the stipulation of accord with League Covenant and ideals. M. Briand accepted chairmanship of the committee and Sir Eric Drummond, League secretary general, was made secretary. The first meeting is to be held in January, and study is to be based on M. Briand's original memorandum and the comments of the governments to which it was sent.

LIMITATION OF ARMAMENT

PREPARATORY COMMITTEE MEETING. Despite the breakdown of Franco-Italian naval negotiations, Chairman Loudon of the Preparatory Committee for a Disarmament Conference recommended that another meeting of his committee should be held on November 3, and this date was approved by the League Assembly. There was considerable agitation among the delegates in favor of fixing a definite date for the disarmament conference next year, but according to the final phrasing of the resolution the preparatory committee was only called upon to complete its work in order that a general conference might be convoked "as soon as possible"—and this will almost certainly not be before 1932. From Washington came the announcement that Ambassador Hugh Gibson would again head the American delegation at the meeting on November 3.

FRANCO-ITALIAN NAVAL DEADLOCK. On September 24 it was announced that negotiations which had been going on between French and Italian naval experts had again reached an *impasse* and had been called off, though there was still a possibility that the problem might be tackled once more by the diplomats. It was said that the Italians were willing to accept a 35 to 40 per cent superiority of French naval tonnage up to 1936, but insisted on a preamble definitely recognizing the principle of parity between the two navies.

Although there is an agreement between the two nations not to begin new construction this year, Italy is said to be advancing rapidly with cruisers already laid down.

JAPAN RATIFIES LONDON PACT. After long delay the special committee of the Japanese Privy Council which has been considering the London Naval Treaty on September 17 recommended its unconditional ratification; and the Council accordingly completed ratification on October 1. Contrary to earlier expectations, no rider was attached censuring the government for accepting the treaty in the face of opposition from the naval general staff. This point, involving the constitutional question of supreme command, was in reality the matter which chiefly occupied the time of the council. Failure to include the censure was doubtless due to the strong support for the Government's action by press, court, and public opinion.

GREAT BRITAIN

THE INDIA PROBLEM. Complete failure of the unofficial peace negotiations with Mahatma Gandhi and other leaders of the Indian nationalists became evident when the government announced in early September that the Mahatma's demands included recognition of full dominion status for India, with admission of the right to secede, and the further stipulation that the Labor government should enter the October conference with this as its announced policy. Meanwhile acceptances from sixty-six Indian leaders to the October Round Table conference indicated that it would bring together representatives of all parties, races, and religions in India except the extremists of the Gandhi faction. The delegates include twenty-two Hindus, fifteen Moslems, and ten native princes.

THE IMPERIAL CONFERENCE. The imperial conference of prime ministers and other high officials representing all the states of the British Commonwealth of Nations, the last meeting of which was held in 1926, opened in London on October 1 with prospects that the session would continue for about six weeks. The agenda of the conference appeared under three general headings: (1) constitutional problems arising out of the new relationship of complete equality between the dominions and the United Kingdom, including plans for creation of an empire court to consider disputes between states of the commonwealth; (2) political problems of foreign policy and defense; and most important of all, (3) the problem of bringing about an economic union based on tariffs and preferential trade agreements to bind together the parts of the empire.

According to a press announcement of J. H. Thomas, British Minister of Dominions, the question of the right of the dominions to secede from the empire need not come up in the conference, since this right is admitted to be inherent in the position of equality in which the dominions now stand. "You cannot prevent a man from committing suicide," said Mr. Thomas. But if this statement may be taken as truly representing the view of the British government, it is evident that the British Commonwealth of Nations is a very loose and precarious confederation. One may wonder what would now happen should the Irish Free State decide for secession. By General Herzog, premier of South Africa and its representative at the conference, this right to leave the empire has been frankly insisted upon, as a preliminary to economic coöperation. The work of the conference will be carried on in secret, chiefly in committees but with occasional plenary sessions.

GERMANY

NATIONALIST SWING IN ELECTIONS. The German Reichstag elections held on September 14 resulted in sweeping gains for the extreme right Fascist party led by the ex-Austrian agitator, Adolf Hittler, at the expense of the Nationalist and Center parties. The Socialists nearly held their own as the largest party in the Reichstag with a total of 143 votes, while the Communists of the extreme left increased from 54 to 76. Most astonishing was the rise of the Fascists from 12 to 107 members. As a result of the large number of votes cast, the size of the Reichstag, which is based on the vote, will increase from 476 to almost 576 members.

Despite the weakening of the center parties, Chancellor Bruening decided to carry on with his present coalition cabinet, which with the support of the Center and the friendly attitude of the Socialists can hope for a majority of about 128 votes. In the event of a defeat in the Reichtag at the opening of its session in mid-October, the Chancellor's plan was to call on President Hindenburg to adjourn parliament, and proceed to carry out his financial measures without parliamentary sanction. This might appear close to dictatorship, but, as pointed out in an article "Dictatorship in Germany" in October *Foreign Affairs*, Article 48 of the German Constitution provides that "if public safety and order is materially disturbed or endangered, the President may take the necessary measures. . . . ." Germany's budget deficit and critical economic situation would seem to justify strenuous action, though dissolution of parliament is a long step away from democratic control. The Chancellor's schemes for balancing the budget include a $150,000,000 loan, salary cuts for all government officials, increased tobacco tax, and a reduction in the unemployment dole.

LIGHT ON GERMAN ESPIONAGE. Echoes of the activities of German agents in America during the World War were heard in the testimony during September before the German-American Mixed Claims Commission, at The Hague, supporting the efforts of the American agent to justify a claim of $40,000,000 for injuries to American commerce and manufacturing during the period of American neutrality. It was admitted that Germans on interned liners had cultivated anthrax and tetanus germs for inoculation of horses and mules collected for export to the Allies, and there was considerable evidence connecting German agents with the Black Tom munitions explosion in 1916 and the explosion at Kingsland, New Jersey, in January, 1917.

SOVIET REPUBLIC

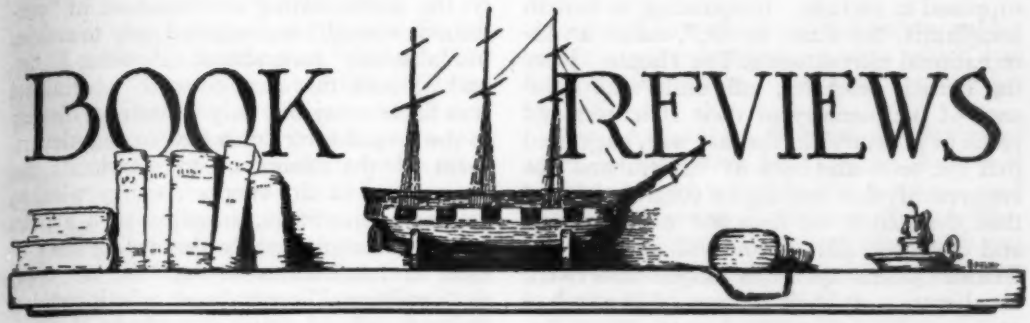
SOVIET DUMPING IN FOREIGN MARKETS. Much excitement was aroused on September 18 by the revelation that the Amtorg Trading Corporation, American agency of the Soviet government, had engaged in heavy short selling of wheat on the Chicago exchange, thus contributing to the fall of wheat prices. Although described by Soviet agents as a hedging operation, with no design of driving down the price of wheat, the sales led to an investigation by the United States Department of Agriculture and the adoption of a rule by the directors of the Chicago board of trade against "selling of futures upon our exchanges by any foreign government." News of the Soviet operations in this country was soon followed by reports of wholesale dumping of Russian commodities in the European markets—including not only wheat, but meats, hides, lumber, oil, and a score of staple products—at prices so far below market quotations as to suggest a deliberate aim to demoralize the markets of the capitalistic countries.

FAR EAST

MANCHURIA ENTERS PEIPING. Coincident with the defeat of the Northern rebels in Shantung and along the Yellow River front, and possibly to prevent the menace of Feng's Army retreating into the northern maritime provinces, the Manchurian dictator, Cheng Hsueh-liang, early in September entered definitely into the Chinese civil strife by advancing about 40,000 Manchurian troops southward into the Peiping area. Notice of this movement was given to Nanking, but it was also based on an understanding with the Northern rebel leaders, for the forces of Yen Hsi-shan turned over Chili province without opposition. Although the Nanking government professed satisfaction at Manchuria's assumption of control in North China, it was significant that northern men were retained in the customs, telegraph, and telephone offices, with instructions from Mukden against their transfer to Nanking. Orders were also issued against the reopening of the Kuomintang party headquarters at Peiping. There appeared more than a possibility of renewed warfare next spring to oust the Manchurian dictator from his hold on North China.

DEFEAT OF NORTHERN REBELS. By the close of September the defense of the Northern rebels in the Lanfang area and along the Yellow River front had completely collapsed. On October 1, Marshal Feng Yu-hsiang gave up his command on pressure from his subordinate generals, and the latter assembled their forces at Chengchow preparatory to turning them over to the direction of Nanking.

ATTACKS ON FOREIGN VESSELS. While the Nanking government was reëstablishing itself by victories in the north, bandit and "communist" outrages continued with increasing violence in the Yangtze provinces. According to despatches at the close of September, fifty attacks on foreign vessels in the Yangtze river had been made in the preceding three months. American gunboats of the Yangtze patrol were repeatedly attacked by rifle fire and also by field guns in the middle Yangtze above Hankow. To an attack on September 25, the *Guam* replied with 300 rounds from machine guns, and the *Luzon*, flag of Rear Admiral T. T. Craven, has repelled several similar attacks. There has been slight or no injury to the American vessels.



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THE NAVAL BLOCKADE. By Lieutenant Louis Guichard, French Navy (attached to the Historical Section of the French Ministry of Marine). Translated by Christopher R. Turner. New York: D. Appleton and Company. 1930. $3.50.

REVIEWED BY LIEUTENANT COMMANDER J. M. CREIGHTON, *U. S. Navy*

This book, of extreme interest to every naval officer, is an authoritative account of the efforts made by the Allies to prevent their enemies from receiving supplies. Any idea that their advantages enabled them quickly to shut off German supplies is soon dissipated.

The desperate effort of the Allies to prevent supplies reaching Germany by way of innocent-looking shipments through neutral countries drove them to the formation of a whole service of trade spies and informers stretching around the world. Merchants suspected or proved to be trading with the enemy were blacklisted by the Allies, and all shipments to them were stopped.

The author speaks at once of the difficulty of putting pressure on the neutrals as long as the United States was one of them. The neutrals were too powerful, and their profits were too available and enormous. Besides, they were entitled by what was generally accepted as international law to trade equally with the belligerents in articles not contraband.

The origin and development of the most essential rules of "International Law" which we study from midshipman days onward are excellently described.

Lieutenant Guichard observes at the beginning of this subject that a neutral vessel may trade freely with a belligerent unless:

1. She resists visit and search.
2. She renders aid to the enemy.
3. She attempts or succeeds in breaking a blockade.
4. She carries contraband.

Dismissing the first two, it is pointed out that no "blockade" of Germany, *per se*, was ever declared.

The program of "Economic Encirclement of the Central Empires" was therefore formed on that fine word "contraband."

By the Declaration of Paris (1856), "a neutral flag covers enemy goods, except contraband of war"; i.e., a Dutch ship loaded with German non-contraband articles, en route to or from Germany, was perfectly safe. The second principal ruling was that an enemy flag does not make neutral goods liable to confiscation just because they are aboard—unless they are contraband.

By the Declaration of Paris, Great Britain gave up her traditional right to confiscate enemy goods of any character found on a neutral vessel. In exchange, the treaty did away definitely with "privateering." "Contraband" was not defined in the treaty.

The Russo-Japanese War of 1904 inflicted injuries upon British trade in the Orient, particularly as a result of the Russian extension of what the word contraband was

supposed to include. Responding to British complaints, the Czar, in 1907, called an international convention at The Hague. Here the British delegates, still under the influence of the memory of their strictures and pains as a neutral in the last war, suggested that the term and idea of "contraband" be suppressed; that nothing be contraband, and that the matter be disposed of decisively, and once for all! (You will see how the British opinion upon this subject underwent an alteration as their picture of themselves as a possible belligerent became more distinct.) Their motion was voted down by the delegates from Russia, Germany, the United States, and France; those of the latter observing that as neutral ships could carry on contraband trade in arms without hindrance from their own governments, they believed some one else to possess means of stopping such things, and preferred to retain them themselves. The principal result of the labors of this conference was the British proposal to establish an "International Prize Court," whose main duty was to look out for the interest of the neutrals in future wars.

The British knew that the public at home would have to have the powers of this court less vaguely defined before they would accept it, and after a year or more of cogitation, called another conference which led to the Declaration of London, 1909.

Here "contraband" became something more tangible and definite in expression. The definitions were given as follows:

(1) "Absolute contraband"—eleven articles, including arms, ammunition, horses, shells, etc.; directly and specifically useful at once in war. It was specified that a belligerent could add articles to this list during a war, if the articles were "susceptible exclusively of military use," and neutrals were notified thereof.

(2) "Conditional contraband"—fourteen articles, including food, fodder, military clothing, fuel and lubricants. This list, also, could be added to. But in order to guard neutrals against too arbitrary and severe additions to items (1) and (2), a list of:

(3) "Free articles" was composed. This contained seventeen objects, which could never be declared contraband of war, absolute or conditional. You will be interested to observe that among these articles were cotton, rubber, fertilizers and ore!

Now—the question of destination! Briefly, the incriminating circumstance of "continuous voyage" was applied only to articles of "absolute" contraband. Articles 33, 34, and 35 said that "conditional" contraband was liable to seizure only if destined directly to the armed forces or a government department of the enemy or to merchants and contractors in the enemy country who, by common knowledge, supplied such articles to the government. By this ruling the doctrine of "continuous voyage" did not apply to "conditional" contraband, which could be stopped only if going directly to the government agencies or contractors mentioned in Articles 33 and 34, and these shipments were not to be stopped if they were to be transshipped at a neutral port en route.

Thus, by the Declaration of London, wheat (food), en route from neutral America, consigned publicly and openly to the German government and routed so as to be discharged at Rotterdam and conveyed up the Rhine by barge, could not be interfered with by the provisions of this Declaration.

Finally (and very important), Article 65 stated that the Declaration had to be accepted as a whole—that you couldn't use the part which helped you and not observe the rest of it.

It is well to state here that when the British public found out about the "International Prize Court," on which they would have but one vote in eight, there was a great disturbance. And when they read that food could be stopped from coming directly to England, even when consigned to merchant contractors who might easily be said to allow some of their supplies to get into the hands of the government, they saw themselves being starved in the next war. The transshipment clause was of no benefit to them, because no other country was contiguous with their islands, while their likely enemies had every available avenue of this kind.

England refused to sign. The Declaration was never ratified, and it was not a legally binding document upon any nation, nor is it yet.

The World War. On August 6, 1914, the United States asked the belligerents to state upon what document they were going to base their actions, and suggested the Declaration of London, even if this had never been ratified.

Germany replied happily that she would

accept the suggestion of the United States, and abide by this Declaration. It suited her perfectly! (Especially as Article 49 stated that if it endangered a belligerent war vessel to attempt to take a proper prize into port, the prize could be destroyed. This was the legal basis upon which she later excused her submarine operations.)

The Allies were about to answer in a similar vein, when they learned that shiploads of grain from America were unloading in Dutch ports, and the canals were full of barges taking this over to Germany.

The British Order in Council of August 20, 1914, and the French decree of August 25 stated that the Declaration of London would be applied, "but with very serious departures from it as regards conditional contraband," and the French declared flatly that they would capture conditional contraband even if en route to a neutral port if its final destination were the enemy. In other words, the exemption of conditional contraband from the doctrine of continuous voyage was thrown overboard by the French three weeks after war was declared.

Upon receipt of these replies the United States declared that, owing to important reservations made to the Declaration of London by various belligerents (the Allies) she would take no account of it during the present war, and requested that the "existing rules of international law" be observed. At the same time we protested that it seemed quite inadmissible that the Allies would presume to capture neutral merchandise en route from our neutral ports to neutral Dutch or Scandinavian ports.

Picture yourself as one of the Allies in these days of crashing nations! They "took counsel" again, and, not wishing to offend the United States, and to satisfy us, avoided placing cotton on the contraband list—which the British had studiously placed on the forever-to-be-free list in 1909 because they had to have our cotton in their mills!

In addition to exempting cotton, the British issued a new Order in Council on October 30, which cancelled their former one of August 20, mentioned before.

This new Order in Council again recognized the validity of the Declaration of London, but conditional contraband en route to a neutral port only became liable to capture when it was consigned "to order," or to an unknown consignee. The order also included new lists of contraband goods, among which appeared certain articles which had been declared to be forever on the free list in 1909.

The American government protested again on December 26, 1914, on the whole subject of contraband and invoices, and ended by drawing attention to the "deplorable condition of American trade which was being excluded from the countries adjacent to Germany."

The British government responded rather ironically on January 7, calling attention to the exports from New York to various European states in November, 1913, and November, 1914. In the case of Holland the figures for the month of 1913 were $558,000. For November, 1914, they were over $7,000,000!

On February 4, 1915, the German government presented a memorandum to all neutral powers on the subject of the action it felt obliged to take owing to the conduct of the Allies in stopping the maritime trade of the neutrals "in defiance of international law."

The actions objected to were:

(1) The addition to the contraband lists of articles "which are either not at all, or only very indirectly employed for military purposes."

(2) The abolition of the distinctions between absolute and conditional contraband and how they were to be treated.

(3) Violations of the Declaration of Paris. (German goods, not of contraband nature, seized on neutral vessels.)

(4) The proclamation of a war zone of the whole North Sea, which amounts, to a certain extent, to an irregular blockade of neutral coasts, which was specifically forbidden by international law.

There then followed Germany's first declaration of submarine war. She declared that from February 18 onward, any *hostile* merchant ship encountered in British or Irish waters, including the channel, would be destroyed without regard for passengers or crew. Neutral ships in these waters might also be endangered, as the ruses of war allowed enemy ships to hoist neutral colors to escape supervision, and mistakes could not always be avoided.

There followed the Order in Council of March 11, 1915. All goods, presumed to be en route to Germany by *any* means, were to

be stopped. The Allies declared a proper observance of the Declaration of Paris of 1856 and said that they would respect non-contraband goods found on neutral ships and not seize them, but would "sequester" them, or return them to their owners.

On May 28, 1916, the Allies sent a joint memorandum to the neutrals to explain that they had started out to try to observe the Declaration of London but that conditions had developed so different from those in any previous war and the Germans had contrived to compromise innocent neutral commerce to such an extent, that the rules laid down in the Declaration could not stand the strain of these changed conditions. This had forced the allied governments to alter or qualify these rules on a number of occasions, and for fear that these modifications had exposed the Allies to misconstruction, they would now declare that they must confine themselves simply to "the historic and admitted rules of the law of nations."

On July 7, 1916, by a simultaneous proclamation in London and Paris, the Declaration of London was declared to be cancelled.

I shall not take you through the engrossing stories of the internal conflicts in the neutral European countries between neutral rights, neutral duties, sympathies pro and con the Allies, and the lure of profits. Every part of this work is absorbingly interesting —and every sailor should read it!

MATTER AND RADIATION. By John Buckingham, M.A. New York: Oxford University Press. 1930. $3.00.

Reviewed by Professor A. F. Wagner, Postgraduate School, *U. S. Naval Academy.*

The author of this book presents in very concise form those fundamental ideas which are absolutely essential to an intelligent understanding of the principles of modern atomic physics. The style employed is very refreshing to readers of scientific literature because it is not the cold fact presenting type common to most scientists. A very noticeable human touch without any sacrifice of scientific accuracy or professional dignity is injected by the author with sufficient frequency to make the reading of this book a real pleasure. This book is not only a real contribution to scientific literature but it is also a "scientific work of art."

The subject matter is divided into five main parts or chapters, namely, Electric Waves, Atoms and Molecules, The Electrical Structure of Atoms and the Production of Radiation, Detection of Infra-red Rays, and Uses of Infra-red Rays.

The chapter on Electric Waves deals with such things as early ideas about light, velocity of light, wave theory of light, acoustic analogies, and Maxwell's theory.

The more important facts regarding atoms and molecules are presented by discussing such subjects as differences between solids, liquids, and gases, motions of the particles of substances, sizes and velocities of the molecules of a gas, atoms are not simple structures, relations between electricity and matter, the idea of energy and its transformation.

In the chapter on the Electrical Structure of Atoms and the Production of Radiation there is presented an excellent brief treatment of such subjects as the Rutherford model, production of light by hydrogen, quantum principle, disruption of atoms, radioactivity, production of infra-red rays.

The fourth and fifth chapters are devoted to a discussion of the detection and uses of infra-red rays. The methods of detection mentioned are color changes, photography, expansion of metals, thermojunctions, electrical resistance changes, radiomicrometers, radiometers, phosphorescence. The chapter on uses of infra-red rays contains facts and information which may have considerable military value and the possible uses mentioned are very interesting. Some of the more important subjects treated are detection of invisible objects, secret signaling, burglar alarms and warning systems, fog penetration and "seeing through fog," distant control of torpedoes and aircraft, self-steering torpedoes, photography of invisible objects through fog, navigation, and infra-red rays, radiation and climate, medical uses.

This book can be highly recommended as one from which people who are not professional scientists can obtain a good brief presentation of the modern physicist's theory of the constitution of matter, and at the same time this book deserves a place in the library of the well-informed physicist.

By C. J. A. Wilson

Courtesy Bendann Art Gallery, Baltimore

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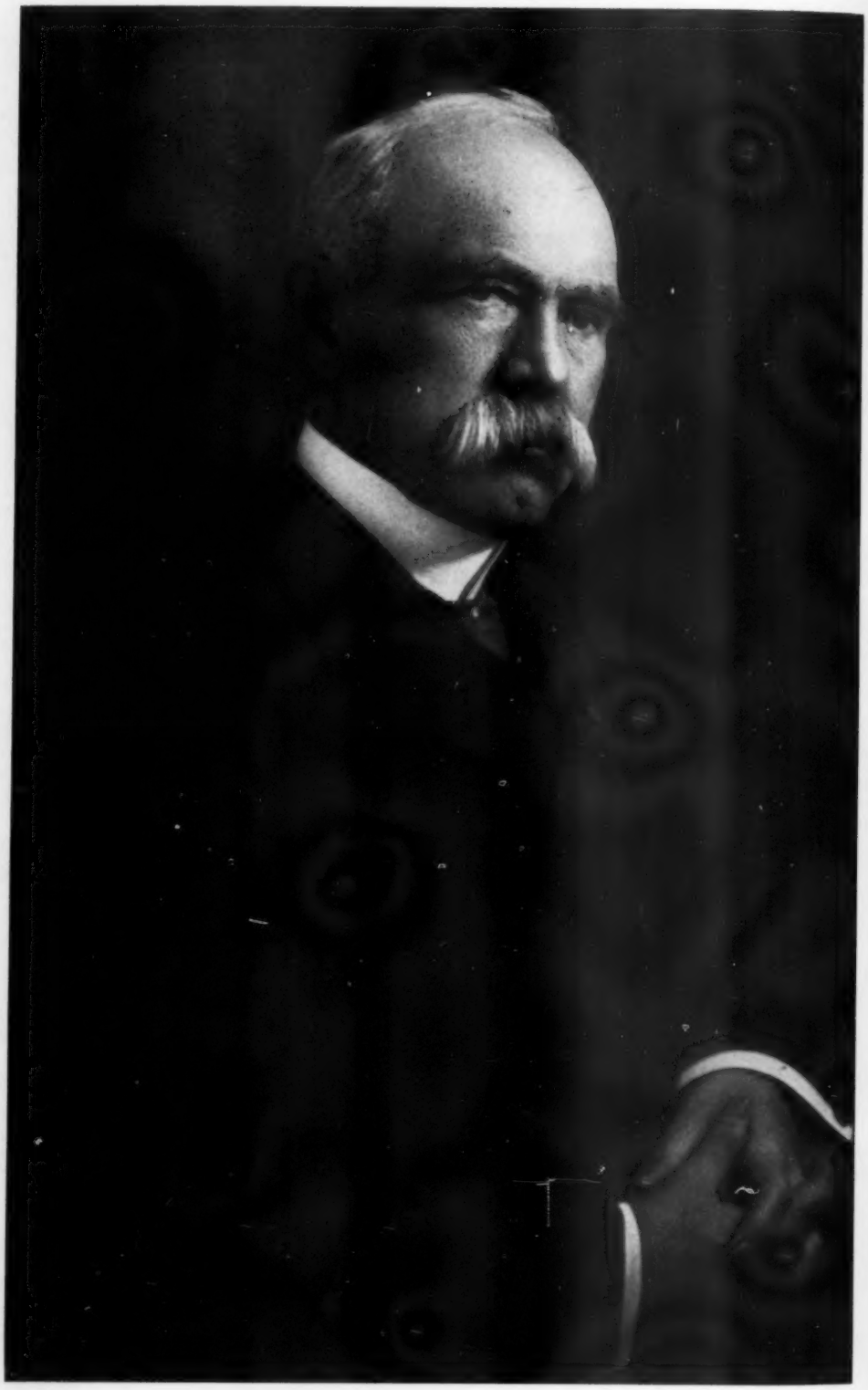
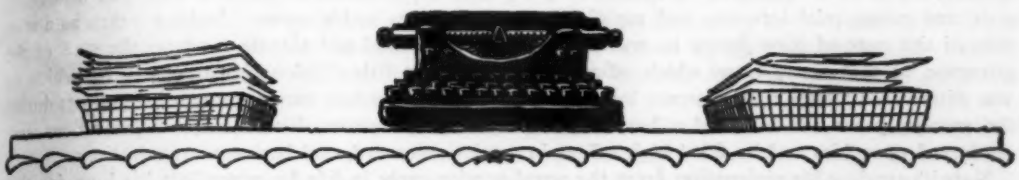


A DISTINGUISHED NAVAL ACADEMY GRADUATE
Colonel Robert Means Thompson

SECRETARY'S NOTES



A Distinguished Graduate The picture used as a frontispiece of these notes is that of Colonel Robert Means Thompson, one of the most distinguished graduates of the Naval Academy in civil life. He was for more than forty years a member of the Naval Institute. The PROCEEDINGS can publish no better account of the services of this great friend of the Naval Academy to his Alma Mater than the address of Chaplain Frank H. Lash, U. S. Navy, delivered in the Academy Chapel at a memorial service on Sunday, September 28.

"I HAVE CALLED YOU FRIENDS"

St. John 15:15

In the Naval Academy library at Mahan Hall stands a life-size bust executed by the hand of Evelyn Beatrice Longman, the sculptress who was introduced to the world of art by her design for the bronze doors of this chapel. An inscription at the base of this bust records the name "Robert Means Thompson," followed by the brief statement "The Academy's Best Friend." Thus at a stroke of the artist's hand was characterized the quality of life by which its subject wished most to be remembered. I bring to you today the story of a great friendship—so constant, so sincere, and so unselfish that it may be considered a humanly complete exemplification of the meaning of that wonderful term.

It is altogether fitting that on this first Sunday of the academic year, the regiment of midshipmen together with the corps of officers and instructors of the Naval Academy, and representatives of patriotic and professional societies with whom this beloved person was identified, should pause with bowed heads and pay tribute to this great friendship. It is a sad occasion—for death is always an unwelcome visitor, yet it is one of the blessed privileges of humanity to blend a fellow feeling of sympathy with the tears of the broken-hearted, and to invoke the healing balm of Divine grace upon the bereaved family which yearns for him whom we knew as a true friend. The actual presence of the one we memorialize today was with us when we met together in this mother church of the Navy amidst the joyful scenes of last June week, and his passing during the intervening days has been an occasion of loss and grief to us all. In conversation with a close member of his family circle several years ago mention was made of his ultimate passing from this life, and he was asked at that time what recognition he most desired *in memoriam*. He replied instantly "If only the midshipmen at Annapolis might want to hold a memorial service at the Naval Academy Chapel it would answer my greatest wish." So we have met today to follow the leading of our own hearts in honoring his memory, and we rejoice to have learned, after the final plans for this gathering were made, that unconsciously we have acceded to his fond wish. No words spoken today can penetrate the mystic veil which separates him from us, nor can mere words portray worthily the character of him whose departure has left the world a poorer place. A life spent in unswerving adherence to certain ideals and the fullness of friendship does not lend itself easily to narration. The best qualities of such lives must be experienced and shared to be appreciated properly. Among his many time-tested friends Robert Means Thompson needs no eulogist. Yet for the benefit of the younger members of the Naval Academy family a brief biographical statement will not be amiss.

Robert Means Thompson was born at Corsica, Pennsylvania, March 2, 1849, and spent his early years in that state. At the age of fifteen he was appointed a midshipman in the United States Navy and entered the Naval Academy as a member of the class of 1868 during the superintendency of Admiral

David G. Porter. He was graduated with honors and went to sea immediately afterwards. He was commissioned an ensign in 1869 and was promoted to master in 1871. During this latter year he resigned his commission to enter the profession of law, and was graduated from the School of Law at Harvard in 1874. Locating in Boston he practiced his profession and became identified with many civic and commercial interests and rapidly attained eminence in his career. In later years, as a resident of the state of New Jersey he was commissioned a colonel and aide-de-camp on the staff of the governor of that state, from which office was derived the title "Colonel" Thompson, by which he was afterwards affectionately known by his many friends. Abundant success crowned his efforts during the passing years and he lived a busy life. Many deserved honors, distinctions, and decorations were conferred upon him and he filled high offices in patriotic, learned, and business organizations.

Notwithstanding his resignation from the naval service early in life he never lost his love for that career, and particularly his affection for his Alma Mater—the United States Naval Academy. Instead of diminishing, this affection increased with the passage of time. By a constant devotion to the resulting friendship his personality became an important factor in the development of the old Navy School into the Naval Academy of today. Throughout the sixty-two years, elapsing subsequent to his graduation and prior to his death on September 5 of this year, an increasing number of incidents firmly forged the bonds of the great friendship which was manifested in so many different manners.

Before the Altar of God, surmounted by the Cross of Christ, reposes today the flag of our country and the colors of the regiment—our National Banner and the Navy Flag—emblematic of the two loyalties which inspired his career; his country to which he rendered unfailing patriotic service, and the Navy which was ever the recipient of his constant devotion. These banners before the sanctuary speak with eloquence beyond words of these two loyalties, and the further high loyalty to Almighty God which their present position clearly indicates.

An outstanding evidence of this friendship was the constant associations he maintained with his fellow alumni. Wherever Naval Academy graduates met and planned for the strengthening of the bonds which unite them in a great brotherhood, there Colonel Thompson was always to be found. It was he who organized and became the first president of the New York Naval Academy Alumni Association, and who later became a prime exponent in the organization of the Naval Academy Graduates Association, of which body he was a patron and trustee until the day of his death. For many years he was also president of the Navy League of the United States, and following his retirement from office he became its president emeritus. By frequent visits to the Naval Academy he maintained a close acquaintance with classes a half century junior to his own. June week never seemed to have fully arrived until his yacht had reached its anchorage in the Severn River. On the occasion of his last visit his failing health caused doubt as to the advisability of the exertion required, but while here he remarked to an old friend that it was his fifty-fifth June Week in Annapolis and credited the inspiration received from these visits with prolonging his life.

Further demonstration of this great friendship was shown by his unusual interest in the Academy itself. It was partly through his personal efforts and strong support that the building plan of the new Naval Academy was conceived and furthered. Being a member of the board of visitors in 1895, he united in a recommendation for the reconstruction of the then inadequate buildings and grounds along the lines of the most approved modern sanitary and architectural development. By personal initiative he had elaborate plans and perspectives prepared for submission to Congress, and on the day of the Battle of Santiago in 1898, a bill was endorsed, and soon became enacted into law which put into effect the plans for the new Naval Academy. The corner stone of the first building was laid in 1899 and he lived to see the completion of the entire project. His constant interest in the physical equipment of the Academy and his cordial willingness to work in close coöperation with the distinguished officials who poured their best years into its planning and realization knit him to it with close ties.

It was by his intense devotion to the cause of physical training and Navy athletics that Colonel Thompson endeared himself to the rank and file of the Navy. During his undergraduate days athletics had been placed on a firm and lasting basis by the superintendent, Admiral Porter. In later years it became necessary that this feature be extended if those qualities of character—self-reliance, poise, and decision—which competition on the athletic fields develops, should be realized in all members of the rapidly enlarging regiment of midshipmen. To promote this he awarded numerous trophies and prizes for excellence in sports, and gave generously of his time and means in the organization of what later became the Navy Athletic Association. This organization really dates from a speech which

he made to an alumni gathering in 1890. From that day onward his enthusiastic support and unswerving loyalty was an inspiration to all Navy teams, as it had been previously in a less tangible form. His interest was made real by many material benefactions bestowed quietly and constantly. The most notable of these is the Thompson trophy cup upon which is engraved annually the name of the midshipman who has done the most during the preceding academic year to promote athletics. Colonel Thompson served as chairman of the American Olympic Committee at Stockholm in 1912, and was the first president and later president emeritus of the American Olympic Association, thus demonstrating that his loyal interest was with the character building ideals of American amateur sports in our national life.

Nor was the interest and friendship of this distinguished benefactor of the Naval Academy confined to its material aspects. He also championed its academic excellence and contributed prizes for scholarship, the principal one being a navigating sextant which is awarded annually to the member of the graduating class who has proved himself to be most proficient in practical and theoretical navigation. In 1899 he joined with two other graduates in presenting to the Naval Academy library a section of 1,231 valuable volumes comprising the most comprehensive collection of books on the history of electricity to be found. This gift was made as a memorial to the classes of 1867-68-69.

The chapel in which we are assembled today was another object of his affection. He shared in installing many of its memorials to the Navy's sainted heroic dead. Its function in the development of the spiritual ideals of those who during their midshipman days worship here, and in later life are actuated by the fine devotion to God and country they have learned within its walls, was ever close to his heart. When the appropriations for the erection of the chapel were inadequate he volunteered to present a set of doors which should in every way be worthy of the edifice as a memorial to his class—the class of 1868. It is interesting to know that when the designs for the heroic bronze portals were submitted, it was found by the committee in charge that the winner of the competition was a nineteen-year-old girl. Learning that her ability to produce the working models for the casting was in doubt, Colonel Thompson with his characteristic generosity provided funds to send her to Europe for a year's study and experience. Today these doors are an inspiration to every person who crosses the threshold, and their twin mottoes *Non sibi sed patriae*—"Not for self but for country," and *Deo et Patriae*—"For God and for country," which link religion and patriotism as inseparable loyalties of the true man of God, have become classic among the terse mottoes which express the Navy's traditional ideals.

Being a man of discernment and strong character he devoutly respected the province of an abiding faith in God as an integral part of life. He came with feeble body and faltering steps last graduation Sunday and took his place within the circle of worshippers where you sit today with saddened hearts giving evidence of your devotion to his memory. He regarded it a rare privilege that day to join in the worship of the Divine for what his heart told him was the last time with those whom he regarded so highly.

I have recounted to you today only some of the many aspects of this unusual and great friendship. What I have told you has been but fragmentary portions of the whole. It was a life bound with all the interests of his Alma Mater. Many memorials to others have been erected here by his hand and with his help, and while the Naval Academy does not possess a single great memorial to this distinguished graduate yet are we not right in saying that the entire fabric of the institution bears a distinct thread of his generosity, enthusiasm, and personality throughout its warp and woof. We can bring no better tribute than to make known the fact that we have not forgotten, and do appreciate what this friendship has meant.

The lives of those who have known Robert Means Thompson will be richer for that acquaintance. Future classes will learn of this great friendship, but will be denied a heritage which has fallen to you. I earnestly commend that you who were present during his visits in the past shall keep, in memory's store house, this man who inspired and was inspired by you.

"Utah"
"Florida"
"Wyoming"

The United States took the lead in meeting the provisions of the London Naval Treaty when the designated battleships to be withdrawn from the fleet were ordered to navy yards in October for dismantling. The *Florida* and *Wyoming* were sent to Philadelphia and the *Utah* to Norfolk. The *Florida* is to be scrapped and the *Wyoming* will be converted into a training ship. This

will involve the removal of three turrets, most of the guns and armament, and only sufficient boiler power will be retained to give a maximum speed of eighteen knots. All ammunition will be removed except that required for target practice guns. The *Utah* will be converted into a target ship. The *Utah* was built by the New York Shipbuilding Company and commissioned in 1911; the *Florida* at the New York Navy Yard and commissioned in 1911; the *Wyoming* at William Cramp and Sons and commissioned in 1912. They comprised the latest types of armament and machinery of their times, and they all won honors in the communication, gunnery, engineering, and battle efficiency competitions. All served overseas during the World War. They have been integral parts of the fleet since commissioning except during the modernization periods, the *Utah* and *Florida* 1924-26, and the *Wyoming* 1925-27. Since modernization they have repeated their excellent performances and the past competition year witnessed the *Utah* again winning the fleet's engineering trophy.

There is scarcely an officer in the service that cannot recall these ships from personal service on board or from some pleasant memory of contact. Their departure is viewed with sincere regret.

Naval reduction and officer training

Under the terms of the London Naval Treaty, the United States is obligated to reduce tonnage in battleships to 429,000, in destroyers to 150,000, in submarines to 52,700. The President ordered the War and Navy Departments to take measures to materially reduce cash withdrawals from the Treasury during the remainder of the fiscal year. He also stated during the past month that the maintenance of respect requires that we sustain a preparedness for defense that is impregnable, yet that contains no threat for aggression. Reductions at the present time are therefore inevitable, and the service is confident that the responsible officials will make fleet dispositions to obtain the greatest efficiency.

Since international agreement has limited the tonnage that we may have, the quality of the tonnage and the quality of the personnel must be the best. Whatever the new construction and replacement may be, the officers of the Navy have the direct responsibility for getting the greatest military strength with the funds appropriated. Nothing should be left undone to give the highest education to those officers necessary in all branches, design, construction, operation. One high naval official has aptly stated the question as follows: "Limitation of armaments has imposed certain restrictions on numbers and sizes of ships. It does not limit the education or ability of personnel. To produce a maximum of power within a limited displacement requires a higher order of technical ability than heretofore when there was no limit to the size of a naval vessel. There will result lighter machinery whose operation and maintenance will be more difficult. In the design of the machinery, we are in competition with the technical experts of foreign navies. There is now more than ever a need for skilled specialists."

Nothing should be left undone to insure that we have leaders who know thoroughly their business of training and operating the ships as a fleet. It is of the utmost importance that there be the highest competence in those who must operate the most important machine on board—the enlisted man.